Stratus® ftServer® 2600, 4500, and 6300 Systems: Operation and Maintenance Guide

Stratus Technologies
R639-02

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Preface

The *Stratus ftServer 2600, 4500, and 6300 Systems: Operation and Maintenance Guide* (R639) describes how to operate and maintain an ftServer 2600, 4500, or 6300 system. It explains how to start up and shut down the system, how to interpret system operational status based on the state of the light-emitting diodes (LEDs), and how to remove and replace the customer-replaceable units (CRUs).

This document is intended for anyone who monitors and maintains ftServer 2600, 4500, or 6300 system hardware.

Revision Information

This manual is a revision. It includes information about ftServer System Software for VMware® vSphere,™ Release 3.0.0.

NOTE

VMware vSphere does not support ftServer 2600 systems.

Notation Conventions

This document uses the notation conventions described in this section.

Warnings, Cautions, and Notes

Warnings, cautions, and notes provide special information and have the following meanings:

WARNING

A warning indicates a situation where failure to take or avoid a specified action could cause bodily harm or loss of life.

CAUTION

A caution indicates a situation where failure to take or avoid a specified action could damage a hardware device, program, system, or data.

NOTE

A note provides important information about the operation of an ftServer system.

Typographical Conventions

The following typographical conventions are used in this document:

- The bold font emphasizes words in text or indicates text that you type, the name of a screen object, or the name of a programming element. For example:

  Before handling or replacing system components, make sure that you are properly grounded by using a grounded wrist strap.

  In the **System Properties** dialog box, click the **Hardware** tab.

  Call the **RegisterDeviceNotification** function.

- The italic font introduces new terms and, in Windows® operating system contexts indicates programming and command-line arguments that the user supplies. For example:

  Many hardware components are *customer-replaceable units* (CRUs), which can be replaced on-site by system administrators with minimal training or tools.

  copy *filename1 filename2*

  Pass a pointer for the *NotificationFilter* parameter

- The monospace font indicates sample program code and output, including message text. For example:

  ```
  #include <iostream.h>

  The operation completed successfully.
  ```

- The monospace also font represents text that would appear on your display screen. The monospace bold font represents text you must type in examples that contain both user input and system output. The monospace italic font represents terms in command lines that are to be replaced by literal values. For example:

  To display the state of a CPU enclosure, type a command in the following format:

  ```
  /opt/ft/bin/ftsmaint ls n
  ```

  If you type **`/opt/ft/bin/ftsmaint ls 0`** at the prompt, the following output appears:

  ```
  H/W Path : 0
  Description : CPU Node Assembly
  .
  .
  .
  ```

- The percent sign (%), dollar sign ($), and number sign (#) are default prompt signs that have a specific meaning at a Linux or VMware ESX™ command prompt. Although a prompt is sometimes shown at the beginning of a command line as it would appear on the screen, you do not type it.
  - % or $ indicates you are logged in to a standard user account and are subject to certain access limitations. The prompt displayed on the screen depends on your shell environment, for example, csh (%) or bash ($).
  - # indicates you are logged in to the system administrator account and have superuser access. Users of this account are referred to as root. The # prompt sign used in an example indicates the command can be issued only by `root`.

Getting Help

If you have a technical question about ftServer system hardware or software, try these online resources first:

- **Online documentation at the StrataDOC Web site.** Stratus provides complimentary access to StrataDOC, an online-documentation service that enables you to view, search, download, and print customer documentation. You can access StrataDOC at the following Web site:

  http://stratadoc.stratus.com

A copy of StrataDOC on supported media for your system is included with this release. To order additional copies of the StrataDOC media or to obtain copies of printed manuals, do one of the following:

  – If you are in North America, call the Stratus Customer Assistance Center (CAC) at (800) 221-6588 or (800) 828-8513, 24 hours a day, 7 days a week.
  – If you are located outside North America, contact your nearest Stratus sales office, CAC office, or distributor; for CAC phone numbers outside the U.S., see:

    http://www.stratus.com/support/cac

- **Online support from Stratus Customer Service.** You can find the latest technical information about an ftServer system through online product support at the Stratus Technical Support Web site:

  http://www.stratus.com/support/index.htm

- **Online product support for Microsoft® products**. Your primary source for support is the computer manufacturer who provided your software, or an authorized Microsoft Support Provider. You can also find the latest technical information about Microsoft Windows and other Microsoft products through online product support at the Microsoft Help and Support Web site:

  http://support.microsoft.com

- **Online product support for Red Hat® Linux products**. Your primary source for support is the manufacturer who provided your software, or Red Hat Global Support Services. You can also find the latest technical information about Red Hat Enterprise and Standard Linux through online product support at the Red Hat Support Web site:

  http://www.redhat.com/apps/support/

- **Online product support for VMware vSphere products**. You can find the latest technical information about VMware vSphere through online product support at the VMware Support Web site**:**

  http://www.vmware.com/support/

If you are unable to resolve your questions with the help available at these online sites, and the ftServer system is covered by a service agreement, please contact the Stratus Customer Assistance Center (CAC) or your authorized Stratus service representative. For information about how to contact the CAC, see the following Web site:

http://www.stratus.com/support/cac

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To provide corrections and suggestions on the documentation, send your comments in one of the following ways:

- By clicking the **site feedback** link at the bottom of a Help topic. Information to identify the topic is supplied in the StrataDOC Web Site Feedback form.
- By email to Comments@stratus.com. If it is possible, please include specific information about the documentation on which you are commenting:
  - For a printed document or a document in PDF format, include the title and part number from the Notice page and the page numbers.
  - For online documentation, include the Help subject and topic title.

This information will assist Stratus Information Development in making any needed changes to the ftServer system documentation. Your assistance is most appreciated.

Regulatory Notice

All regulatory notices are provided in the site planning guide for your system.

Chapter 1
Overview of ftServer 2600, 4500, and 6300 Systems

The following topics provide an overview of ftServer systems:

- "System Features" on page 1-1
- "System Design" on page 1-1
- "System CRUs" on page 1-12

System Features

Stratus ftServer 2600, 4500, and 6300 systems contain redundant (duplexed) components that process the same instructions simultaneously (in *lockstep*). If one of the duplexed components fails, its partner continues operating, eliminating system downtime and data loss.

Stratus failsafe software adds a layer of security to the lockstep technology, preventing many software errors from resulting in outages. Software issues are captured, analyzed, and reported to Stratus, allowing support personnel the ability to address software problems before they recur. Stratus' hardened device drivers further enhance the reliability of the operating system environment on ftServer systems.

Optional support by the *Stratus ActiveService Network* (ASN) provides remote service and incident management of the system by the Stratus Customer Assistance Center (CAC) or your authorized Stratus service representative.

Many components of the ftServer systems are *customer-replaceable units* (CRUs), which allow easy removal and replacement of faulty components by on-site personnel with minimal training or tools. See "Description of System Components" on page 1-9 for more information.

System Design

Each ftServer 2600, 4500, and 6300 system is rack-mounted and consists of a chassis, two CPU-I/O enclosures, a front panel assembly with a DVD drive and USB port, a backplane assembly with an optional modem for connecting to the ASN network, and peripheral components.

ftServer 2600, 4500, and 6300 systems come in the following processor configurations:

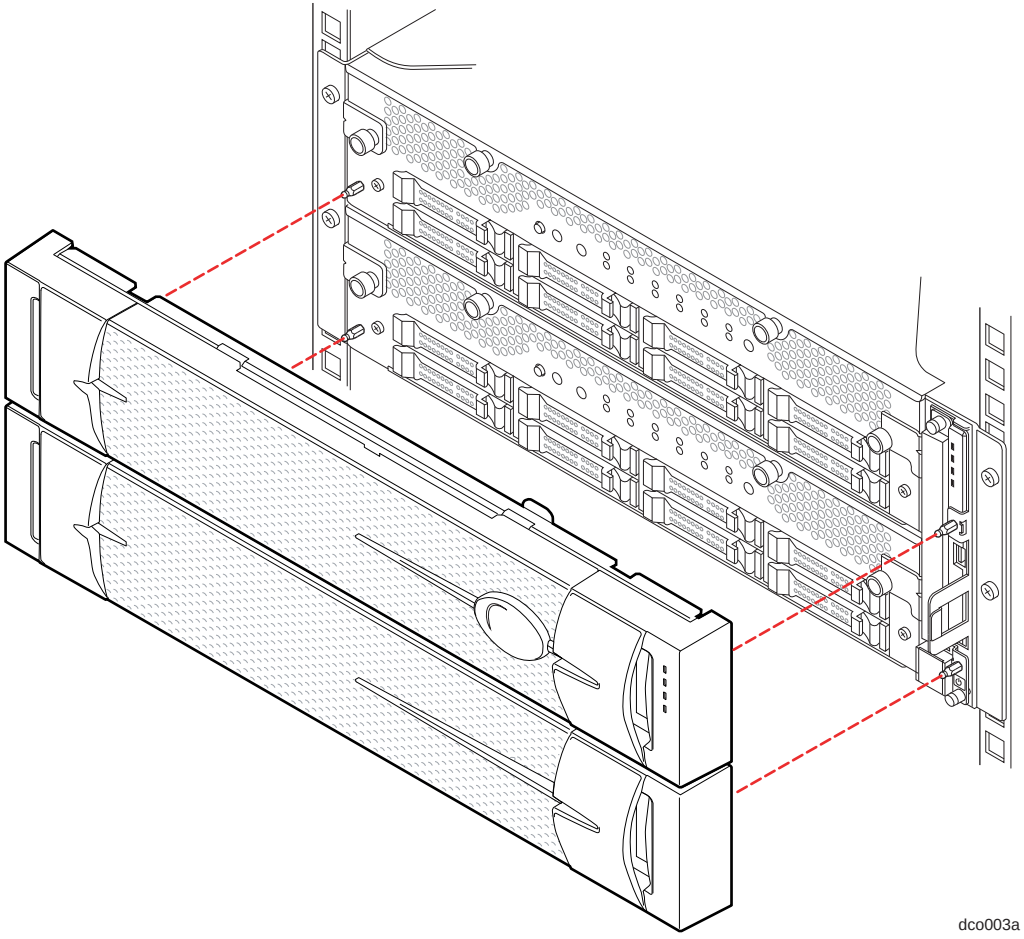
- ftServer 2600 systems: single-processor
- ftServer 4500 systems: single-processor or dual-processor
- ftServer 6300 systems: dual-processor

NOTES

1. ftServer 2600 systems are not available with ftSSS for VMware vSphere.
2. In single-processor systems, the second processor socket contains a dummy heatsink that is necessary for proper air flow.

Figure 1-1 shows a front view of an ftServer 2600, 4500, or 6300 system with a bezel. Four light pipes on the upper right side of the bezel provide a view of the system status LEDs when the bezel is installed.

Figure 1-1. ftServer 2600, 4500, and 6300 Systems



The following subsections provide more system design information.

- "CPU-I/O Enclosures: Front" on page 1-4
- "CPU-I/O Enclosures: Rear" on page 1-6
- "Description of System Components" on page 1-9
- "Peripheral Components" on page 1-11

CPU-I/O Enclosures: Front

Each ftServer 2600, 4500, or 6300 system comprises a minimum of two CPU-I/O enclosures. Each CPU-I/O enclosure contains a *CPU element* and an *I/O element* joined to the same board. The elements are numbered as follows:

- Upper enclosure: CPU element - 0 and I/O element - 10
- Lower enclosure: CPU element - 1 and I/O element - 11

Figure 1-2 shows a front view of the two CPU-I/O enclosures in a system, without the bezel installed.

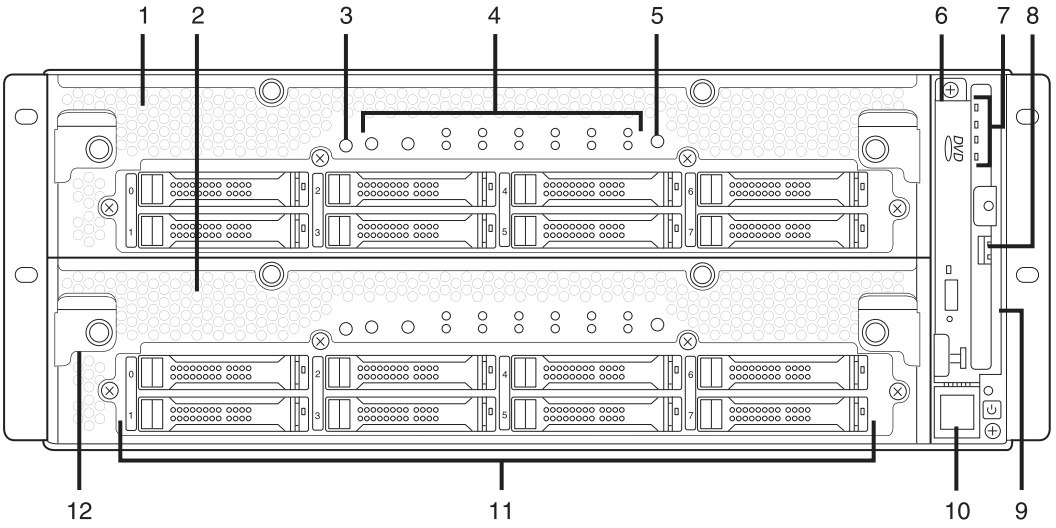
Both CPU-I/O enclosures are powered by a single power button (number 10 in Figure 1-2) that is located on the bottom of the system front panel.

One of the I/O elements is the *primary* (or *active*) I/O element, while the other is the secondary I/O element. The primary I/O element drives control of the video, USB ports, COM ports, DVD drive, and modem (if attached). The PRIMARY system LED (see Figure 3-2 and Table 3-2) indicates which CPU-I/O enclosure contains the primary I/O element. (The primary CPU element may reside in the same CPU-I/O enclosure as the primary I/O element, or it may reside in the other CPU-I/O enclosure.)

NOTE

For the sake of simplicity, this manual uses the term *primary* (or *active*) *enclosure* in some cases to indicate the CPU-I/O enclosure in which the primary I/O element resides.

Figure 1-2. ftServer 2600, 4500, and 6300 Systems: Front View

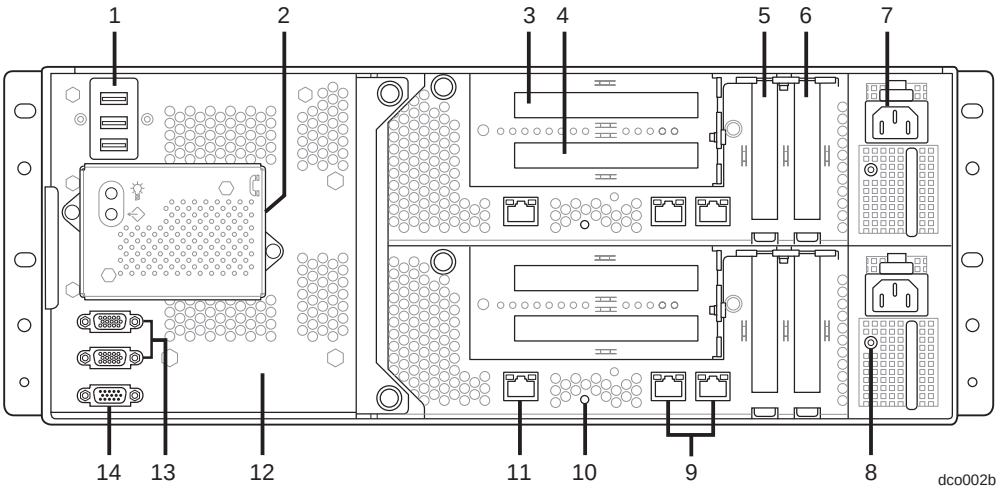


1	CPU element 0, I/O element 10	7	Front panel LEDs
2	CPU element 1, I/O element 11	8	USB port
3	System ID button (magnifying glass icon)	9	Front panel
4	CPU-I/O enclosure LEDs	10	Power button
5	NMI (dump) button	11	Internal disk drives (16) or disk drive blanks
6	DVD drive	12	Release levers (4)

CPU-I/O Enclosures: Rear

Figure 1-3 shows a rear view of the CPU-I/O enclosures. See "Description of System Components" on page 1-9 for a brief synopsis of some of the components identified in the figure.

Figure 1-3. ftServer 2600, 4500, and 6300 Systems: Rear View

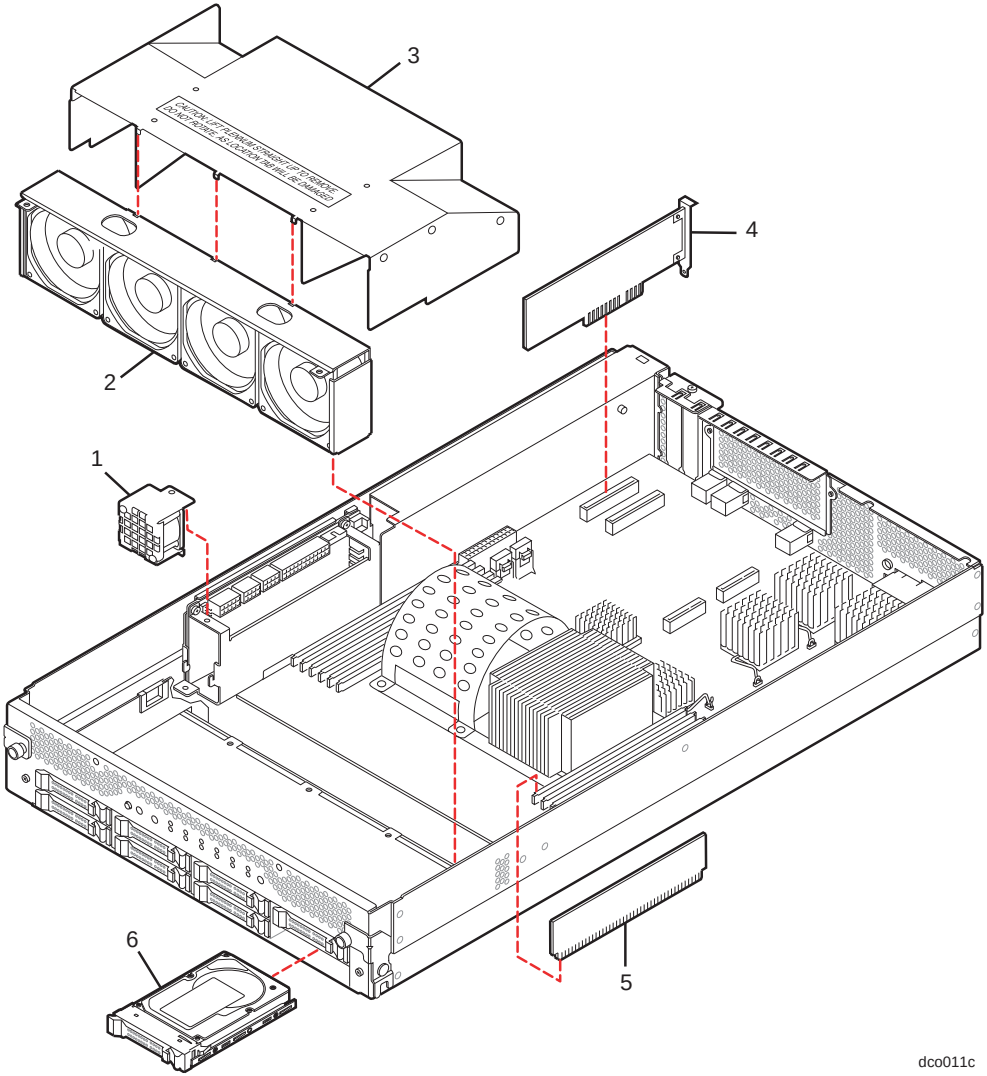


1	USB ports (3)	8	Power supply LED (2)
2	Modem and telephone port (on the side) A modem is an optional component, so the telephone port is not present if there is no modem.	9	Ethernet ports (4)
3	PCI adapter slot 3 (PCIe or PCI-X). Not available on ftServer 2600 systems.	10	CPU-I/O enclosure blue system identifier LED (2)
4	PCI adapter slot 4 (PCIe or PCI-X). Not available on ftServer 2600 systems.	11	VTM Ethernet port (2)
5	PCI adapter slot 1 (PCIe)	12	System backplane
6	PCI adapter slot 2 (PCIe)	13	Serial (COM) ports (2)
7	CPU-I/O enclosure power receptacle (2)	14	VGA (monitor) port

Interior Components

Figure 1-4 shows the interior of an ftServer 2600 system CPU-I/O enclosure. (ftSSS for VMware Vsphere does not support ftServer 2600 systems.)

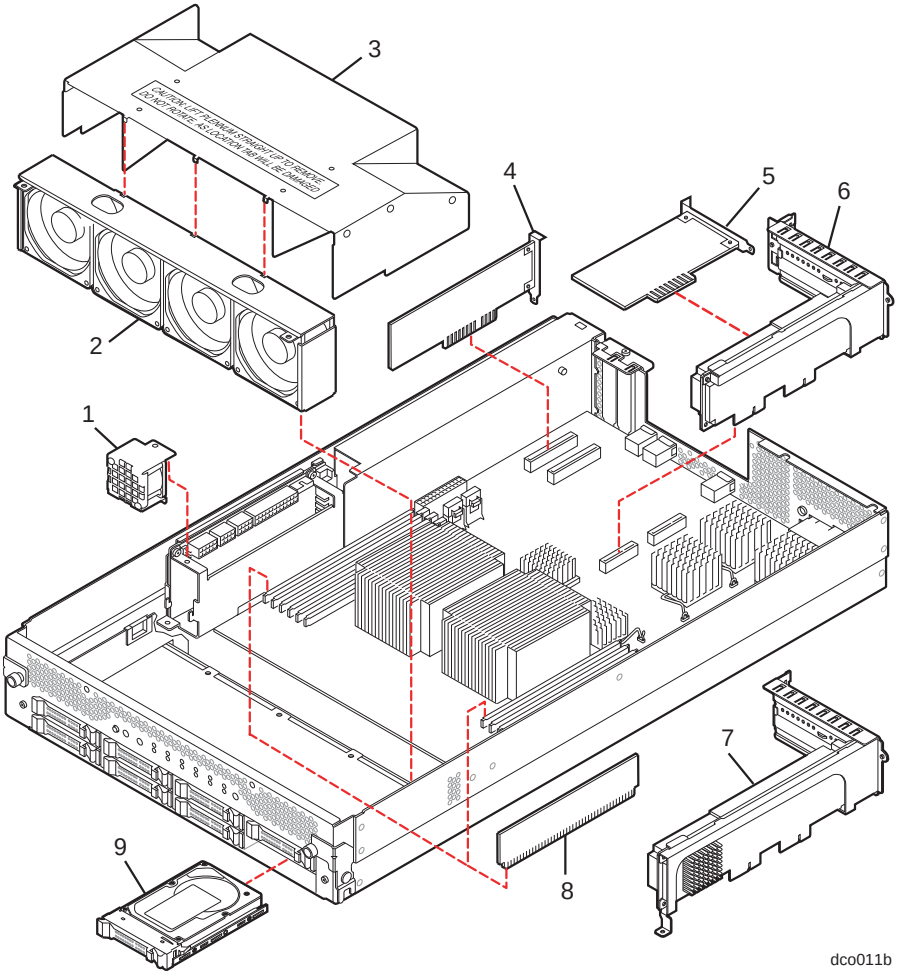
Figure 1-4. CPU-I/O Enclosure: Interior Components, Model 2600



1	Power supply fan	4	Low-profile PCI adapters (2 max.)
2	CPU-I/O enclosure fan assembly (4)	5	DIMMs (6 max.)
3	Plenum	6	Disk drives (8 max.)

Figure 1-5 shows the interior of a dual-processor ftServer system CPU-I/O enclosure.

Figure 1-5. CPU-I/O Enclosure: Interior Components, Models 4500 and 6300



1	Power supply fan	6	PCIe riser assembly
2	CPU-I/O enclosure fan assembly (4)	7	PCI-X riser assembly (offset from system)
3	Plenum	8	DIMMs (6 or 12 max.)
4	Low-profile PCI adapters (2 max.)	9	Disk drives (8 max.)
5	Full-height PCI adapters (2 max.)		

Description of System Components

This section describes the major CRUs and ports of an ftServer 2600, 4500, or 6300 system. See Chapter 3 for a description of the LEDs and buttons on the front of the enclosure.

CPU-I/O Enclosures

An ftServer 2600, 4500, or 6300 system consists of two enclosures. Depending on the system model and option chosen, each enclosure contains either one or two processors.

CPU-I/O Enclosure Fan Assembly

Each CPU-I/O enclosure is cooled by an assembly of four fans. The assembly is a CRU.

DIMMs

Each CPU-I/O enclosure supports up to 12 four- or eight-gigabyte (GB) customer-replaceable DIMMs, for a maximum memory capacity of 96 GB per enclosure. Single-processor systems support a maximum of 6 DIMMs per enclosure.

Dual-processor systems support a maximum of 24 DIMMs per system. Single-processor systems support a maximum of 12 DIMMs per system.

Internal Hard Disk Drives

Each enclosure supports up to eight SAS 2.5-inch hot-pluggable hard disk drives that are available in models of 73-, 146-, or 500-GB capacity. Slots not occupied by a disk drive must be closed with a disk-drive blank.

Front Panel and DVD Drive

Each system includes one front panel unit that contains a USB 2.0 DVD drive, a system power button, system status LEDs, and a USB 2.0 port.

NOTE

ftServer systems running ftSSS for VMware vSphere support the DVD drive and other USB storage devices only during the initial software installation process and maintenance periods. For information about enabling the DVD drive after installation, see the *Stratus ftServer System Administrator's Guide for VMware vSphere* (R002E).

NMI Button

Pressing the nonmaskable interrupt (NMI) button on the primary CPU-I/O enclosure for four to eight seconds shuts down the system and generates a crash dump file. See "Using the NMI Button to Create a Dump File" on page 3-22 for more information.

System Backplane

The system backplane assembly connects the two CPU-I/O enclosures to each other. It also houses three USB ports, two serial communications ports, the VGA port, and the socket for the modem assembly.

Modem

The modem, which attaches to the system backplane, provides bidirectional communication with the Stratus ActiveService Network (ASN). The modem is not hot-pluggable. You must use software commands to turn off the modem before you remove it.

USB Ports

Four external USB 2.0 ports, three on the back of the system and one on the front panel, are user-configurable and support the keyboard and mouse.

NOTE

On ftServer systems running ftSSS for VMware vSphere, only a supported USB keyboard and mouse can be plugged into the system's USB ports during normal operation. For information about temporarily enabling support for USB storage devices during system maintenance periods, see the *Stratus ftServer System Administrator's Guide for VMware vSphere* (R002E).

PCI Adapter Slots

ftServer 2600 systems have two user-configurable slots per CPU-I/O enclosure (four per system). ftServer 4500 and 6300 systems have four user-configurable slots per CPU-I/O enclosure (eight per system). PCI adapter slots 1 and 2 support only low-profile PCI adapters. PCI adapter slots 3 and 4, on the optional PCIe or PCI-X riser available for ftServer 4500 and 6300 systems, support full-height and low-profile PCI adapters.

The PCI slots support low-profile or full-height adapters of the following dimensions:

- Slots 1 and 2 (on motherboard)—low-profile PCIe adapters only; maximum dimensions: 6.6 in. (167.75 mm) long, 2.536 in (64.41 mm) high
- Slot 3 (upper slot on PCIe riser or PCI-X riser)—low-profile or full-height adapters; maximum dimensions: 7.7 in (195.84 mm) long, 4.2 in (106.68 mm) high
- Slot 4 (lower slot on PCIe riser or PCI-X riser)—low-profile or full-height adapters; maximum dimensions: 6.6 in (167.64 mm) long, 4.2 in (106.68 mm) high

The low-profile PCI slots are physically labeled 1 and 2. The full-height slots are labeled 3 (the upper slot) and 4 (lower). The numbers are silk-screened on the enclosure exterior and are the same numbers that identify the slots in the software.

See the *Stratus ftServer Systems: PCI Adapter Guide* (R461) for detailed information about PCI adapters.

PCI Riser

An optional right-angle expansion PCI riser accommodates full-height PCI adapters in the low-profile interior of the 2U (a *U* is a rack unit: 1.75 in.) CPU-I/O enclosure. PCI risers hold the connected adapters in a position parallel to the motherboard. ftServer 4500 and 6300 systems support two models of PCI riser: PCIe and PCI-X.

Ethernet Ports

Each CPU-I/O enclosure contains two Ethernet ports that operate at 10, 100, or 1000 megabits per second (Mbps) and connect to the embedded Ethernet controller.

Virtual Technician Module (VTM) Port

The VTM connects to the Internet over the VTM port. The VTM enables authorized system administrators to manage and diagnose the ftServer system from the local system or, more typically, from a remote management system. VTM functionality is combined with that of the Baseboard Management Controller (BMC) in a single hardware component.

Power Distribution Unit (PDU)

A PDU distributes and manages power for the system and peripheral components.

Peripheral Components

See the *Stratus ftServer Systems: Peripherals Site Planning Guide* (R582) for descriptions of supported peripheral components, such as monitor units, keyboards, tape drives, and storage systems.

System CRUs

Table 1-1 alphabetically lists the ftServer 2600, 4500, and 6300 system customer-replaceable units.

Table 1-1. Customer-Replaceable Units

CRUs	
Bezels	Modem assembly
CPU-I/O enclosure covers	PCI adapters—full-height and low-profile
CPU-I/O enclosures	PCI riser assembly and its adapters
CPU-I/O enclosure fans	Plenum
DIMMs	Power distribution units (PDUs)
DVD drive	Power supply unit (PSU) fan
Internal hard disk drives	System backplane assembly
Front panel assembly	

See the *ftScalable Storage: Operation and Maintenance Guide* (R600) for information about removing and replacing CRUs in an ftScalable Storage system.

Chapter 2
Hardware Operation

The following topics describe the basic operation of ftServer 2600, 4500, and 6300 systems:

- “Standby Power” on page 2-1
- “System Power” on page 2-2
- “Starting Up the System” on page 2-2
- “Shutting Down the System” on page 2-3
- “Fan Speed” on page 2-4

See the vendor documentation for information about operating optional equipment.

Standby Power

When one or both of the system power cords are connected to live power outlets, low-level *standby power* is present in the system. Standby power enables the primary Baseboard Management Controller (BMC) to monitor the status of system components, even when the system power is off.

Standby power also allows for continuous operation of the VTM ports and the modem assembly. Therefore, while the system power is off, administrators or, if authorized, the CAC or your authorized Stratus service representative, can still connect to the system through the VTM ports to diagnose problems, or to turn system power on and off from a remote location.

WARNING

Standby power remains present even after the system has been powered down. To remove power to the standby devices, remove the power cords.

System Power

ftServer 2600, 4500, and 6300 systems have one power button (see Figure 1-2) located on the system front panel. You press this button to start the system.

Pressing the Power Button (Windows and Linux Systems)

The system power button functions as follows:

- If the system power is **off** and standby power is **on**, pressing the power button turns the system on and boots the operating system.
- If the system power is **on** and the operating system or BIOS is starting, stopping, or running, pressing the power button momentarily initiates an orderly system shutdown. (Standby power remains on.)
- If the operating system hangs or a hardware failure occurs, pressing the power button for several seconds shuts down the system power. (Standby power remains on.)

CAUTION

If you do not want to risk the loss of data that might occur from this action, you can attempt less-drastic actions to restart the system. The *Stratus ftServer Virtual Technician Module User's Guide* (R642) describes how to perform these actions.

Pressing the Power Button (VMware ESX Systems)

CAUTION

Pressing and releasing the system power button on the front of the system immediately shuts down the system power. Use VMware software tools to gracefully turn off a system.

Starting Up the System

Make sure the system power cords are plugged into a live power source.

NOTE

When a Windows Server 2008 system boots, a blank screen displays for up to two and a half minutes before the operating system load bars appear. The system can take five minutes or more to boot.

To boot a system and start the operating system

1. Turn on the monitor and any other peripheral devices.
2. Press the power button on the bottom of the system front panel (see item 11 in Figure 1-2).

Shutting Down the System

WARNING

The system's standby devices have power even after the system has been powered down. To remove power to the standby devices, you must remove the power cords.

Exit from all applications before shutting down a system.

To shut down an ftServer Windows system

1. On an ftServer system running:
   - Windows Server 2003, click the **Start** button on the Windows desktop, and then click **Shut Down**.
   - Windows Server 2008, click the **Start** button, then click the right-arrow button to the right of the padlock icon, and click **Shut Down** on the menu that appears.
2. In the **Shut Down Windows** dialog box, check or uncheck the **Planned** box.
3. In the **Options** drop-down list, select a reason for the shutdown.
4. If desired, add appropriate information in the **Comment** box.
5. Click **OK**.
6. Respond appropriately if a message appears about other people being logged on to the computer.
7. Click **Yes** to shut the system down.
8. Turn off power to the monitor and any peripheral devices.

To shut down an ftServer Linux system

Shut down the system by performing one of the following actions:

- Log out and then click the **Shutdown** command on the login screen.
- Type `poweroff` or `shutdown -p` from a command line.

Your computer should then power down automatically. If not, you can safely turn off the system power when you see the message `Power Down`.

To shut down the computer (VMware ESX systems)

CAUTION

Before you shut down the system, make sure you have considered the impact on virtual machines. You may want to move them, or make sure that they shut down gracefully. See the *vSphere Basic System Administration* document for information about how to perform these steps.

1. Log on to your VMware ESX service console.
2. Do one of the following:
   - Execute the `shutdown` command from the service console; for example:

     ```
     # shutdown -P -h now
     ```

   - Click the **Shutdown** button on the vSphere Client window.

When you shut down a VMware ESX system, note that the following behavior is normal:

- The system stays powered on for a minute or two, as all services are stopped and cached data is written to disk.
- If VMs are running, shutdown could take longer than a minute or two. If the VMs are scheduled to suspend on system shutdown it can take even longer depending on how many VMs are running and how much memory they have been assigned.

Fan Speed

You might notice fan-speed increases in high-temperature environments, during high system activity periods, or while performing an IPL (loading the operating system software), shutting down the system, or restarting the operating system. The increase in fan speed ensures adequate cooling under these conditions and is normal behavior.

Chapter 3
Troubleshooting the Hardware

The following topics provide information about troubleshooting ftServer 2600, 4500, and 6300 systems:

- "Information About Troubleshooting" on page 3-1
- "System Administration Documentation" on page 3-2
- "Status LEDs and System Buttons" on page 3-2
- "General Hard Disk Drive Problems and Solutions" on page 3-19
- "DVD Drive Problems and Solutions" on page 3-20
- "Using the NMI Button to Create a Dump File" on page 3-22

Information About Troubleshooting

If you have a service contract with Stratus, you are not required to troubleshoot complex problems or perform major repairs on ftServer 2600, 4500, or 6300 systems. ftServer System Software monitors all hardware malfunctions. If a malfunction is transient, the affected hardware component restarts automatically. If a malfunction is permanent, the software takes the affected part out of service and activates the part's failure LED.

Failures are automatically reported to the Customer Assistance Center (CAC) or your authorized Stratus service representative through the ActiveService Network (ASN). Failures are also logged in the system event log.

When the ASN notifies the CAC or your authorized Stratus service representative of a problem, they notify you of the problem and troubleshoot it. If the affected part is a CRU, the CAC or your authorized Stratus service representative outlines a procedure for you to follow to correct the problem. When the event log indicates that a part has failed, follow these steps:

1. Locate the failed part. If its simplex operation LED is **on**, **do not** remove the part without first checking with the CAC or your authorized Stratus service representative. See "Status LEDs and System Buttons" on page 3-2 for information about which LEDs indicate failure and which indicate simplex operation.

2. If you have not been contacted by the CAC or your authorized Stratus service representative, notify them of the suspected part failure. They will verify your assessment of the failure.

   For the most current list of CAC or your authorized Stratus service representative locations and telephone numbers, refer to http://www.stratus.com/support/cac.

   If the part is a CRU, proceed to Chapter 5. If it is not a CRU, the CAC or your authorized Stratus service representative will dispatch a certified customer engineer (CE) to your site to further troubleshoot the failure and, if needed, to replace a failed part.

3. If you are instructed by the CAC or your authorized Stratus service representative to replace a CRU, see Chapter 5 for the appropriate replacement procedure.

System Administration Documentation

Your ftServer Windows system came with the ftServer StrataDOC (Windows Version) disk, which includes the *Stratus ftServer System Administrator's Guide for the Windows Operating System* (R014W) and online help for ftSys Management Console (ftSMC). These sources describe the software methods of implementing some functions described in this guide.

Your ftServer Linux system came with the ftServer StrataDOC (Linux Version) disk, which includes the *Stratus ftServer System Administrator's Guide for the Linux Operating System* (R003L). The system administrator's guide describes the software methods of implementing some functions described in this guide.

Your ftServer VMware ESX system came with the ftServer StrataDOC (VMware Version) disk, which includes the *Stratus ftServer System Administrator's Guide for VMware vSphere* (R002E). The system administrator's guide describes the software methods of implementing some functions described in this guide.

Status LEDs and System Buttons

Status LEDs are located on the front and rear of each enclosure. Some LEDs indicate the overall state of each enclosure and other LEDs indicate the state of individual components in the enclosures.

A System ID button and an NMI (*nonmaskable interrupt*) button also appear on the front of each enclosure.

Stratus 2600, 4500, and 6300 systems support three main groupings of status LEDs:

- System front panel LEDs summarize the overall operational state of the system. They indicate the presence or absence of power, the simplex or duplex operation

of the system, and the presence of system faults. They also include a system identifier (ID) LED.

- An array of system LEDs located on the front of each CPU-I/O enclosure, behind the system bezel, provide the signaling described in "CPU-I/O Enclosure Status LEDs" on page 3-5. These LEDs indicate more specifically the various system metrics that are summarized by the system front panel LEDs. In order to view these system LEDs, you must remove the system bezel.
- LEDs on the rear of each CPU-I/O enclosure indicate the status of system power, data transmission and rates, and provide system identification. The LEDs on PCI adapters are also visible on the rear of the CPU-I/O enclosures. See the *Stratus ftServer Systems: PCI Adapter Guide* (R461) for information about the LEDs on PCI adapters.

At any time, the LEDs can be in one of three states:

- Off (unlit)
- On (steady)
- Blinking

You can determine the state of a particular component by interpreting the combinations of LED colors and states. For example, you can determine:

- If system components are operating in *duplex* mode, in which the components are partnered and the partner is operating properly. If you remove a duplexed component from service, the system continues to operate; the duplexed component is *safe to pull*.
- If system components are operating in *simplex* mode, in which the partner failed or was removed. If you remove a simplexed component from service, that component's function is eliminated from the system and the system may crash.

For information about each status LED and system button, and actions you can take with respect to the state of the system, see one of the following topics:

- "System Front Panel LEDs" on page 3-4
- "CPU-I/O Enclosure Status LEDs" on page 3-5
- "Buttons on the CPU-I/O Enclosure" on page 3-8
- "Hard Disk Drive Status LEDs" on page 3-10
- "Ethernet and VTM Port LEDs" on page 3-12
- "Ethernet and VTM Port LEDs" on page 3-14
- "Power Distribution Unit Status LEDs" on page 3-17

Refer to vendor documentation for information about LEDs in optional components.

System Front Panel LEDs

Each ftServer 2600, 4500, and 6300 system has a system front panel that includes the LEDs shown in Figure 3-1. Light pipes on the system bezel provide a view of these LEDs.

The system front panel LEDs summarize the overall status of the system and provide all of the most-significant status information you need to maintain a running ftServer

2600, 4500, or 6300 system. Another set LEDs, located on the CPU-I/O enclosure behind the bezel, provides similar information on a more-detailed level. See “CPU-I/O Enclosure Status LEDs” on page 3-5.

Figure 3-1. System Front Panel LEDs

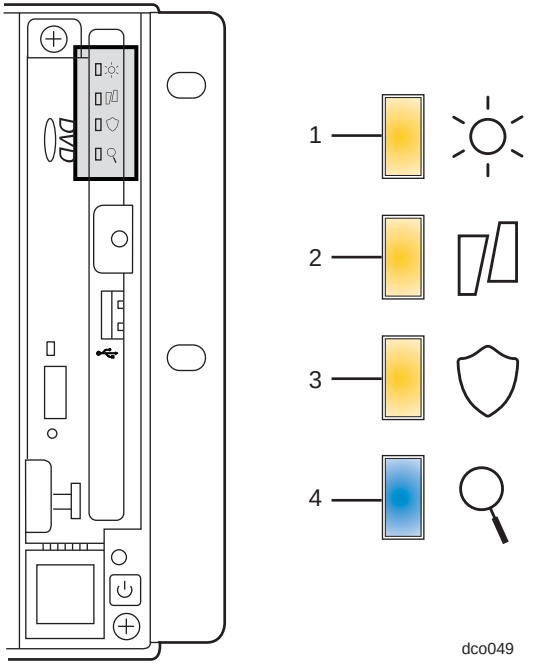


Table 3-1 describes the system front panel LEDs.

Table 3-1. System Front Panel LEDs

LED	States	Description
System Power	Green On	Either or both CPU-I/O enclosures have power.
	Green Off	Neither CPU-I/O enclosure has power.
System Fault	Blinking Yellow (highest priority)	Failing component cannot be identified. Both CPU-I/O enclosures should be replaced.
	Yellow On	Critical component failure.
	Yellow Off	System is either off or operating normally.
System Fault Tolerance	Blinking Green (highest priority)	ActiveUpgrade is running. System is attempting to bring the CPU-I/O enclosures into duplex operation.
	Green On	System is duplexed.
	Off	System is simplexed.
System ID	Blue On	A system ID command is running.
	Blinking Blue	Remote management command is identifying the system.
	Off (lowest priority)	No system ID command is running.

CPU-I/O Enclosure Status LEDs

On ftServer 2600, 4500, and 6300 systems, behind the bezel, the front of each CPU-I/O enclosure contains the set of system LEDs shown in Figure 3-2. The LEDs indicate faults detected in a range of enclosure components to help you identify problems and expedite the repair process.

When the system detects a component in a fault state, the component's corresponding LED lights up. If, for example, a component reaches its voltage threshold, the VLT LED illuminates. If the component returns to normal, its LED goes out.

In some cases, the component is automatically taken offline, and its LED stays lit until the component is replaced or brought back online.

For example, if a processor in a CPU-I/O enclosure reaches a temperature threshold and does not return to normal, the system removes the enclosure from service, and its TEMP LED remains on. If the processor cools down to beneath the temperature

threshold, the TEMP LED goes off. What happens subsequently depends on factors related to the system's modular configuration and the outcome of its attempts to restart.

When a CPU-I/O enclosure is taken offline, its partner enclosure continues to operate, in simplex mode. If the partner also overheats, an orderly shutdown or (if an orderly shutdown is not possible) an abrupt shutdown will be performed automatically.

In ftServer 2600, 4500, and 6300 systems running simplexed and at high temperature, all fans operate at maximum speed and continue to operate, unless the thermal threshold is reached, which causes an abrupt power shutdown.

Figure 3-2. CPU-I/O Enclosure LEDs and Buttons (Bezel Removed)

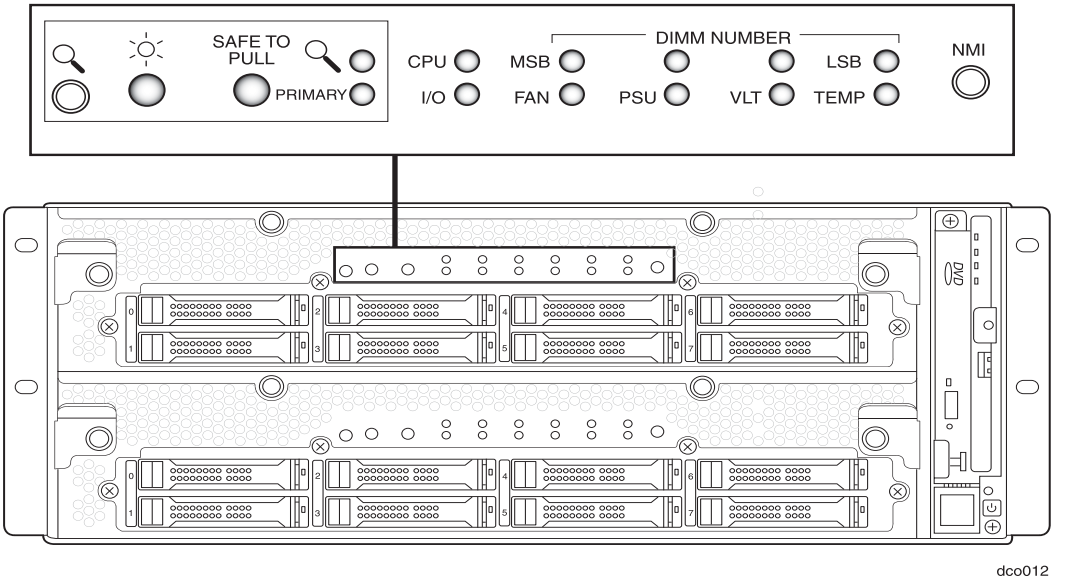


Table 3-2 lists (from left to right) the LEDs and describes their status. (In Figure 3-2, the magnifying glass icon on the far left and NMI label on the far right identify buttons, not LEDs. See "Buttons on the CPU-I/O Enclosure" on page 3-8.)

N O T E S

1. The SAFE TO PULL LED indicates whether an enclosure is fault-tolerant, that is, duplexed and safe to remove. An enclosure is safe to remove when all system components are running normally and all paired components have fully operational partners.
2. The four Memory Faults LEDs described briefly in Table 3-2 are described in detail in Table 5-1.

Table 3-2. CPU-I/O Enclosure LEDs

LED Label or Icon	State	Description
Power	Off	AC power off (cord is removed).
	Green On	DC power on.
	Blinking Green	AC power on and DC power off. System is on standby power only.
SAFE TO PULL	Off	CPU-I/O enclosure offline.
	Green On	CPU-I/O enclosure safe to pull.
	Blinking Green	CPU-I/O enclosure not safe to pull.
PRIMARY	Off	The I/O element in this CPU-I/O enclosure is not the active element.
	Green On	The I/O element in this CPU-I/O enclosure is the active element.
System ID† One on front and one on back of system	Off	No request to identify system activated.
	Green On	Identify system activated by ID button.
	Blinking Green	Remote request from the ftSMC snapin (on Windows systems) or the `ftsmaint identify [start|stop] path` (on Linux and VMware ESX systems).
I/O†	Off	Normal operation.
	Yellow On	Fault detected.
CPU†	Off	Normal operation.
	Green On	Fault detected.
FAN†	Off	Normal operation.
	Yellow On	Fan fault.
MSB ... LSB	MSB and LSB: most-significant bit and least-significant bit. These four memory fault LEDs, bracketed by the DIMM Number label, are explained in "Memory Fault LEDs" on page 3-8 and Table 5-1.	
PSU	Off	Normal operation.
	Yellow On	Bulk power supply fault.

Table 3-2. CPU-I/O Enclosure LEDs *(Continued)*

LED Label or Icon	State	Description
VLT	Off	Normal operation.
	Yellow On	DC voltage fault.
TEMP†	Off	Normal operation.
	Yellow On	Temperature fault.

† The LED state is maintained even when enclosure DC power is off.

Memory Fault LEDs

The memory fault LEDs light up only when the CPU element of the CPU-I/O enclosure has failed and is out of service. The four LEDs are bracketed beneath the DIMM NUMBER label on the enclosure front. The LEDs illuminate to indicate a number (from 1 – 12) that identifies the faulty DIMM (see Table 5-1 for details). The LED array presents the digits in binary notation, using left-to-right, most-significant-bit (MSB) to least-significant-bit (LSB) order.

NOTE

Note the state of the LEDs before the powering off the CPU-I/O enclosure.

When you power off the CPU-I/O enclosure, the memory fault LEDs will also go off. However, if the CPU-I/O enclosure is powered down and there is no record of the LED states, you may still be able to find the number of the failed DIMM in the Windows System Event Log messages or in `var/opt/ft/log/ema.log.`*`n`*, the Environmental Monitoring Application (EMA) log on Linux and VMware ESX systems.

To replace DIMMs, see “Replacing and Adding DIMMs” on page 5-25. Table 5-1 describes the four-LED array that identifies the location of memory faults in the DIMMs.

Buttons on the CPU-I/O Enclosure

Two buttons are located on the front of each CPU-I/O enclosure: the ID button ( ) and the NMI button, as shown in Figure 3-2.

Pressing the system ID button once makes the three system ID LEDs blink: the ID LEDs on the front and back of the enclosure and the one on the front panel (see Figure 3-1). The front panel ID LED blinks blue when either one or both of the system ID LEDs blink. The blinking LEDs help you locate a specific enclosure that may be mounted in a heavily populated rack.

On Windows systems, you can cause the system ID LEDs to blink by issuing the **Start Slot Identification** command from ftSMC. To stop the system ID LEDs from blinking, press the system ID button a second time or issue the **Stop Slot Identification** command from ftSMC.

On Linux and VMware ESX systems, you can cause the system ID LEDs to blink by using the `ftsmaint identify start` *`path`* command. To stop the system ID LEDs from blinking, use the `ftsmaint identify stop` *`path`* command.

You can also use the VTM console to cause the system ID LEDs to blink. From the VTM console, click **Remote Control**, and then click **SID LED Switch**.

NOTE

You must use the same method to stop the system ID LEDs from blinking as you had used to start them blinking.

The NMI (*nonmaskable interrupt*) button inititates an NMI, which saves the contents of memory to a dump file, and then restarts the operating system. For more information, see "Using the NMI Button to Create a Dump File" on page 3-22.

LEDs on the Back of the CPU-I/O Enclosure

There are several LEDs on the back of the CPU-I/O enclosure (refer to Figure 1-3).

The power supply LED lights steady green to show that the power supply is receiving power. See Table 3-3 for details.

Table 3-3. Power Supply LED

LED State	Description
Blinking Green	The CPU-I/O enclosure has AC power. Standby voltages are present.
Steady Green	The CPU-I/O enclosure power supply is enabled. All power supply DC voltages are present.
Blinking Amber or Steady Amber	CPU-I/O enclosure power fault detected.

The system ID LED identifies the CPU-I/O enclosure. It is green when lit. See "CPU-I/O Enclosure Status LEDs" on page 3-5 for details.

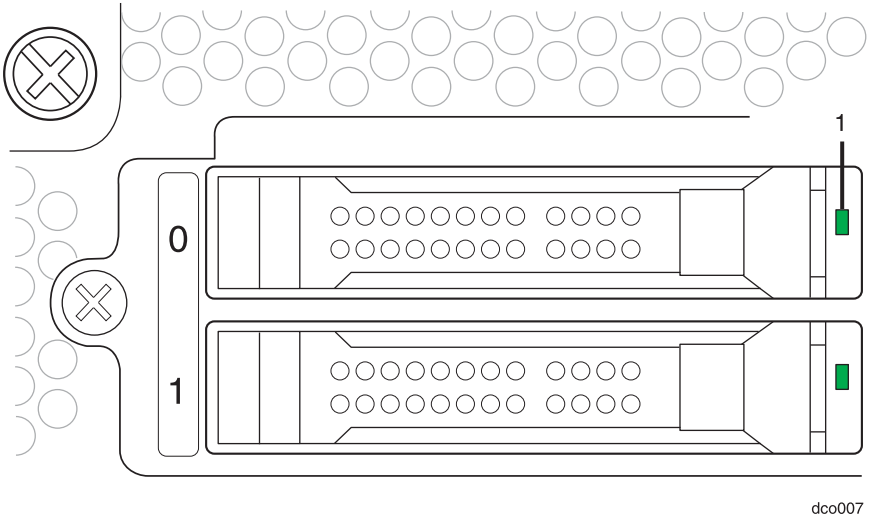
Ethernet LEDs and VTM port LEDs indicate the operational status and transmission rates of the respective components. See "Ethernet and VTM Port LEDs" on page 3-12 for details.

PCI adapter LEDs indicate the operational status of the PCI adapters. See the *Stratus ftServer Systems: PCI Adapter Guide* (R461) for details.

Hard Disk Drive Status LEDs

Each hard disk drive has a single LED (Figure 3-3), which may be on, off, green, blinking green, yellow, or blinking yellow. Table 3-4 describes the hard disk drive LED states.

Figure 3-3. Hard Disk Drive LEDs



1 Hard disk drive LED

Table 3-4. Hard Disk Drive LEDs

Status	Description
Off	Safe to remove. Idle or duplexed.
Steady green	Do not remove. System is locating (identifying) a disk.
Steadily blinking green	Safe to remove.

Table 3-4. Hard Disk Drive LEDs *(Continued)*

Status	Description
Blinking green/yellow (source disk) Blinking green (target disk)	Do not remove. The source disk is resynchronizing its partner disk. The LED appears to flash rapidly, alternating between green and yellow. (Actually, the green LED is blinking on access and may appear always on. The yellow LED is blinking at approximately 0.5 Hz.) Although it is safe to remove the target disk, doing so necessitates a full resynchronization when the disk is reinserted. The green LED flashes rapidly during resynchronization.
Steady yellow	Safe to remove. Disk drive is broken. Action: Verify that the drive is properly installed. Verify the connection by removing and replacing the drive. If necessary, replace the drive with a new one. See your system administration documentation for information about component failures and ways to correct them. If you are unable to fix the condition, contact the CAC or your authorized Stratus service representative.

Table 3-4. Hard Disk Drive LEDs *(Continued)*

Status	Description
Blinking yellow	Unsafe to remove: The disk drive is simplexed. • If the drive is part of a mirrored drive pair, the partner drive is unavailable. **Action:** Reinsert the partner drive to restore duplex operation. Verify that the partner drive is functioning normally. • If the drive is not part of an mirrored pair, a non-mirrored volume exists on the drive. Or, a mirrored volume exists on the drive, but its partner volume is unavailable. **Action:** If the drive contains a mirrored volume, reinsert the drive that contains its partner volume to restore duplex operation. If the drive is not mirrored, consider creating a mirrored drive pair or another type of mirrored set to increase fault tolerance. • If the drive is part of a mirrored drive pair or it contains part of a mirrored volume pair, the drive or volume is resynchronizing. **Action:** Wait for the process to complete. See your system administration documentation for information about mirrored volumes.
Rapid, intermittently blinking green	Disk is duplexed (all volumes are mirrored), data is being written to or read from the disk, and the disk is safe to remove.

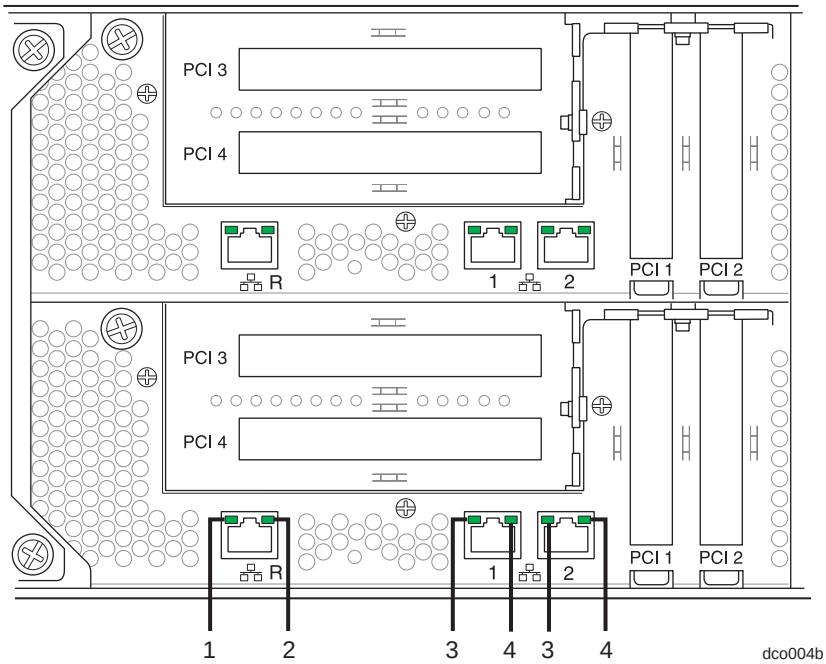
Ethernet and VTM Port LEDs

Each CPU-I/O enclosure contains:

- Two Ethernet ports that operate at 10, 100, or 1000 Mbps and connect to the embedded Ethernet controller. Each port has two integrated LEDs that indicate Ethernet activity and connection speed.
- One VTM port that has two integrated LEDs that indicate activity and connection speed.

Figure 3-4 shows the LEDs for the Ethernet ports and VTM ports.

Figure 3-4. Ethernet and VTM Ports: Status LEDs



1 VTM port activity LED

2 VTM port connection speed LED

3 Green Ethernet port activity LED

4 Green or yellow Ethernet port connection speed LED

Table 3-5 describes the activity LED states for the Ethernet ports and VTM ports.

Table 3-5. Ethernet Port and VTM Port Activity LED States

LED State	Description and Meaning
	Activity LED is off. No link is present.
	Activity LED is lit steady green. The link is present but idle.
	Activity LED is lit blinking green. Data is being transferred over the link.

Table 3-6 describes the states of the connection speed LED for the Ethernet port and the VTM port.

Table 3-6. Ethernet Port and VTM Port Connection Speed LED States

LED State	Description and Meaning
	Connection-speed LED is off. Port is connected at 10 Mbps.
	Connection-speed LED is lit steady green. Port is connected at 100 Mbps.
	Connection-speed LED is lit steady yellow. Port is connected at 1 Gbps.

See your system administration documentation for information about component failures and ways to correct them.

Modem Assembly: Status LEDs

When present, a single modem assembly is attached to the system backplane assembly at the rear of the system. The modem assembly has a green power LED and a yellow attention (fault or identify) LED.

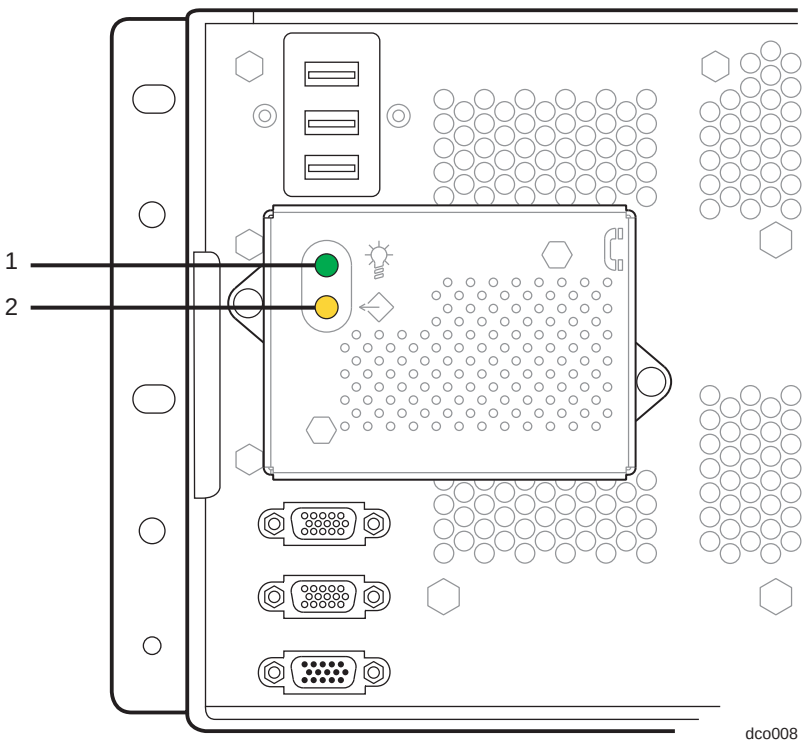
Figure 3-5 shows the modem-assembly status LEDs. Table 3-7 describes the modem-assembly LED states.

See your system administration documentation for information about component failures and ways to correct them.

CAUTION

Do not remove the modem assembly when it is powered on (steady green LED). For information about removing and replacing a modem assembly, see "Replacing or Installing a Modem Assembly" on page 5-49.

Figure 3-5. Modem Assembly: Status LEDs



1 Green LED (power indicator) 2 Yellow LED (fault or identifier indicator)

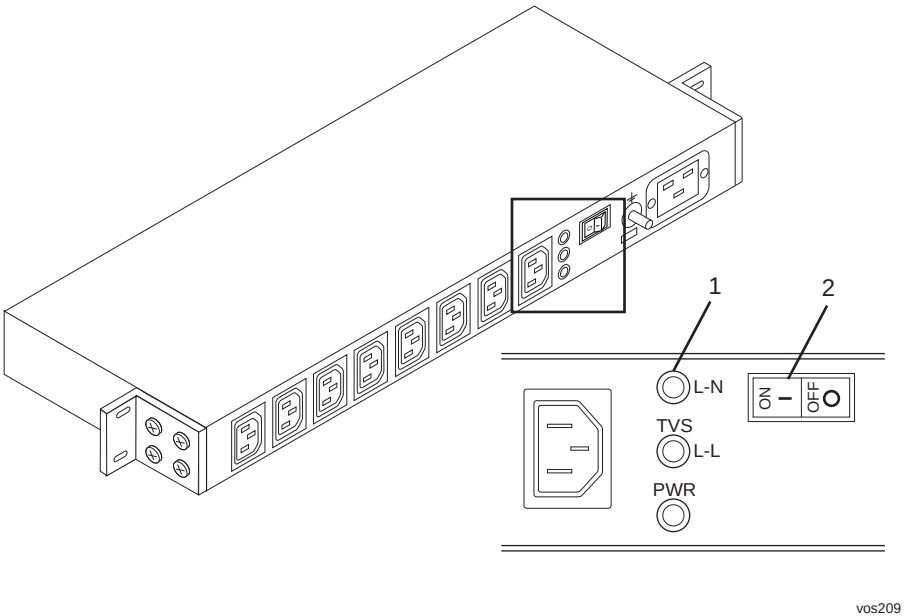
Table 3-7. Modem Assembly: LED States

LED States	Description and Meaning
	Green power LED and yellow attention LED are off. Modem is powered off and safe to remove.
	Green power LED is off and yellow attention LED is on. A fault was detected. The modem is powered off and safe to remove. For information about removing and replacing a modem assembly, see “Replacing or Installing a Modem Assembly” on page 5-49.
	Green power LED is on and yellow attention LED is off. Modem is powered on and operating normally. However, a powered-on modem is **unsafe to remove**.
	Green power and yellow attention LEDs are on. Modem is powered on but has a fault. However, a powered-on modem is **unsafe to remove**.
	Green power LED is on and yellow attention LED is blinking. Modem is being identified. See your system administration documentation for the procedure to identify a modem. Modem is **unsafe to remove**.

Power Distribution Unit Status LEDs

The model AA-P87600 power distribution unit (PDU) status LEDs (Figure 3-6) reflect the status of the PDU.

Figure 3-6. PDU Status LEDs



1	Status LEDs	2	Circuit breaker switch

Table 3-8 describes the meaning of the status LEDs.

N O T E

In the table, MPS refers to *main power source*, and TVS refers to *transient voltage suppression*.

Table 3-8. Model AA-P87600 PDU Status LEDs

LEDs	Input Power States		Description
TVS L-N TVS L-L Main Power	Power Source	Circuit Breaker	
	Off	O - Off	MPS, TVS Operational
	Off	I - On	MPS, TVS Operational
	On	O - Off	MPS, TVS Operational
	On	I - On	MPS, TVS Operational
	On	I - On	MPS, TVS L-L Fuse Blown Replace the PDU.

Table 3-8. Model AA-P87600 PDU Status LEDs *(Continued)*

LEDs	Input Power States		Description
	On	I - On	MPS, TVS L-N Fuse Blown Replace the PDU.

General Hard Disk Drive Problems and Solutions

Table 3-9 lists some problems that the internal SAS disk drives may encounter, as well as some corrective actions. For more information, see your system administration documentation.

Table 3-9. Troubleshooting Disk Drives

Problem	Action
System will not boot from system disk	Ensure that booting from a disk drive is enabled through the BIOS Setup program.
	Try to boot from the system disk's mirrored partner. To do so, unlatch the suspected faulty system disk.
Cannot access data	Some files might contain viruses. Run a virus-scan utility on the disk drive.
	Some files might be corrupted. If possible, restore the files from a backup. If there is a problem with the system files on a Windows system, and you have an Automated System Recovery (ASR) backup, use the ASR backup to repair the system files. See the Help for Windows for more information.
Disk drive fails, or disk status LED is steady yellow	Use the system diagnostic software to try to determine what might have caused the disk drive to fail. If you cannot resolve the problem, contact the CAC or your authorized Stratus service representative.

Table 3-9. Troubleshooting Disk Drives *(Continued)*

Problem	Action
System does not recognize disk drive	Ensure that the disk drive was installed correctly. See "Removing and Inserting an Internal Hard Disk Drive" on page 5-45 for information about installing a disk drive. For external USB disk drives, ensure that the USB cable is plugged into the USB connectors on the system backplane assembly or front panel. You cannot connect a USB disk drive or solid-state drive to the system through the USB connectors on the keyboard. On VMware ESX systems, ensure that you have explicitly enabled USB storage for use as described in the *Stratus ftServer System Administrator's Guide for VMware vSphere* (R002E). The system is not fault tolerant when USB storage is enabled. When you are finished, be sure to reboot the system to disable USB storage and resume fault-tolerant operation.
Slow response time	The disk drive might be full. Ideally, at least 15 percent of the disk drive should be free for system activity. Delete unnecessary files, or move files to another disk drive.
	You might need to defragment the disk drive.
	Mirror regeneration might be occurring. Try to schedule mirror regeneration for a time when the system is not heavily used. However, if the disk contains business-critical data, you should regenerate the mirrors as soon as possible.
	The disk drive might be reading a compressed file. In the future, avoid compressing files that are heavily used.
	Many read or write operations might be queued to the disk drive.
	Errors might be occurring on the drive. Check the system event log.

DVD Drive Problems and Solutions

The DVD drive has a single LED that indicates whether the drive is busy. It does not have an LED that indicates whether a fault has occurred.

Table 3-10 lists some problems that the DVD drive could encounter, as well as some corrective actions.

Table 3-10. Troubleshooting the DVD Drive

Problem	Action
Drive is not working properly	Ensure that the disc has been inserted correctly.
	Ensure that the disc is in the correct drive, and that you are accessing the correct drive.
	On VMware ESX systems, ensure that you have explicitly enabled the DVD drive for use as described in the Stratus *Stratus ftServer System Administrator's Guide for VMware vSphere* (R002E). The system is not fault tolerant when the DVD drive is enabled. When you are finished, be sure to reboot the system to disable the DVD drive and resume fault-tolerant operation.
	Check for environmental problems that can damage DVD media and drive heads. Environmental problems can result from airborne contaminants (smoke, steam, dust, and ashes) or radiated interference (hand-held receivers, communications and radar installations, and radio/television broadcast transmitters).
	Check that no paper or plastic label, or any residue, is attached to the surface of the disc that is in use.
	Ensure that the correct drivers are installed.
	Ensure that the drive was installed correctly. See "Removing and Replacing a DVD Drive" on page 5-46 for more information.
System cannot read disk	Ensure that the disc is clean and does not contain any scratches. Attempt to read a known good disk.
Disk drawer will not open	Insert a straightened paper clip into the emergency eject hole.
System will not boot from DVD drive	Ensure that booting from a disk drive is enabled in the BIOS Setup program.
Busy Indicator stays on	Ensure that the disc has been inserted correctly.
	Ensure that the DVD drive is operating properly by attempting the same operation with a different disc. If the second disc works, the first one might be damaged.

Using the NMI Button to Create a Dump File

To enable CAC or your authorized Stratus service representative to diagnose problems with your system, you might need to create a snapshot, or *dump* file, of the system's memory while the system is running.

NOTE

On VMware Systems, this procedure provides a dump of the VMkernel memory.

One way to create a dump file is to press the NMI button on the system's active CPU-I/O enclosure (the enclosure whose PRIMARY LED is lit). The NMI button is the right-most button on the front of the enclosure (Figure 3-2).

CAUTION

Pressing the NMI button stops any running applications. Do not perform a dump operation if you want any applications to continue in operation. Instead, schedule downtime for this procedure. If your CPU-I/O enclosures are duplexed, you might prefer to use operating system commands to dump system memory while keeping the system online.

NOTES

1. The NMI button and the PRIMARY LED are located behind the system bezel and are not visible if the bezel is attached. You can remove the bezel to access the buttons and LEDs, or you can use system management commands to initiate dump procedures or view LED states. See the system administration guide for your system, as described in "System Administration Documentation" on page 3-2.
2. When a system is in duplex mode, the NMI button on the active CPU-I/O enclosure is enabled. When a Windows system is in Active Upgrade mode, the NMI buttons on both enclosures are activated.
3. On VMware ESX systems, this procedure provides a dump of the console operating system (COS) memory as well as a dump of the VMkernel memory.

To create a dump file, press and hold the NMI button on the active enclosure for four to eight seconds, then release it.

If you use the NMI button incorrectly, or if the button is pressed by mistake, the system handles the dump signal as follows:

- If you tap the button, hold it for less than four or longer than eight seconds, the system counts this as a spurious signal and ignores it.
- If you press the button more than once within a five-second period, the system also counts this as a spurious signal and ignores it.

NOTE

If you intend to generate a dump file for an enclosure where the NMI button has been disabled, you should use another method to save the dump file before resetting the BMC, because otherwise you might lose valuable troubleshooting data.

For detailed information about dumps and to use operating system commands to dump system memory, see the system administrator's guide for your system.

For more sources of technical information about ftServer system hardware or software, see "Getting Help" in the Preface.

Chapter 4
General Servicing Information

The following topics provide general servicing information concerning the unpacking, storing, and repacking of customer-replaceable units.

- “Unpacking CRUs” on page 4-1
- “Storing CRUs” on page 4-2
- “Repacking CRUs” on page 4-2
- “Replacing a CRU” on page 4-3
- “General Safety Precautions” on page 4-3

See Chapter 5, “Installing and Replacing System Components” for detailed removal and replacement information.

Unpacking CRUs

Upon receiving a CRU, perform the following:

- Inspect the packing slip to ensure that the correct CRU was received.
- Inspect the packing container for damage.

Refer to the Warranty Parts Replacement Process and Return Instructions Web Site at http://www.stratus.com/licenses/partreturn.htm if either of the following conditions applies to your shipment:

- You received the wrong shipment.
- The package is damaged.

If there are no problems, unpack the CRU.

To unpack the CRU

1. Observing any printed directions or warnings, carefully open the package.
2. Carefully remove the protective packaging and save it for possible reuse in storing or returning a CRU.

3. Verify that you received the correct CRU by checking the packing slip and the bar code label on the CRU.
4. Inspect the CRU for shipping damage.
5. If the CRU is wrapped in an antistatic bag, keep it in the bag until it is installed. If you are not going to install the CRU immediately, protect it from damage by repacking it in its shipping package.
6. Follow the appropriate procedure in Chapter 5, “Installing and Replacing System Components” to install the CRU.

Storing CRUs

If you need to store a CRU, keep it in the protective packaging and take the following precautions:

- Ensure that the CRU is right-side up by following the directions on the carton.
- Comply with all warning labels.
- Avoid placing the CRU in a location where heavier items might be placed on it.
- Protect the CRU from exposure to dust, electromagnetic fields, vibrations, extreme heat, or any other environmental conditions that might damage the CRU.
- Avoid prolonged storage that could reduce the useful life of the CRU.

If you are uncertain about the proper storage conditions for a specific CRU, see “Getting Help” in the Preface. Also, see “Using ESD Precautions” on page 5-2 for information about how to protect components from exposure to static electricity.

Repacking CRUs

When returning a defective or incorrect CRU, package the CRU using the original packing materials or the replacement-CRU packing materials. Ensure that the CRU is adequately protected from the following:

- Dents, scratches, and impact damage
- Static electricity (using the pink or blue electrostatic discharge (ESD) bag)
- Accidental opening of the package in transit
- Detachment of the address label

If you are uncertain that the CRU will be adequately protected during shipment, see “Getting Help” in the Preface.

Replacing a CRU

Before replacing a CRU, do the following:

- Confirm that the CRU has failed and needs to be replaced. You can view failure information from the status LEDs on each hardware component and from your system's event or error logs.
- Determine if a component needs to be taken out of service. See your system administration documentation for information about using software commands or tools to remove a component from service before you physically remove it.
- Take proper grounding precautions. When handling components, especially those with exposed integrated circuits, use proper grounding procedures to avoid ESD damage to the component. See the information about using ESD precautions.
- Observe the proper safety precautions. Follow the precautions listed in "General Safety Precautions" on page 4-3.

After replacing a CRU, do the following:

- Replace the system bezels.
- Place the component in service if it is out of service.
- Verify system operation.
- Package and ship the failed component. See "Repacking CRUs" on page 4-2.

General Safety Precautions

- To help identify problems that might occur during the CRU removal and replacement, read the entire procedure before performing it.
- Provide enough space and light to perform the procedure safely and accurately.
- Conduct all activities in compliance with all applicable industry safety standards and practices.
- When performing maintenance procedures, do not wear conductive articles or material such as rings, bracelets, keys, chains, garments with metallic thread, and so forth.

Chapter 5
Installing and Replacing System Components

The following topics describe CRU replacement procedures:

- “Before Replacing CRUs” on page 5-2
- “Removing the Bezel” on page 5-4
- “Removing and Replacing a Front Panel” on page 5-6
- “Removing and Replacing a CPU-I/O Enclosure” on page 5-8
- “Removing and Replacing a CPU-I/O Enclosure Cover” on page 5-16
- “Removing the Plenum” on page 5-19
- “Replacing the System Backplane Assembly” on page 5-20
- “Replacing and Adding DIMMs” on page 5-25
- “Removing and Replacing the CPU-I/O Enclosure Fan Assembly” on page 5-31
- “Removing and Replacing the Power Supply Fan” on page 5-33
- “Removing and Installing a Low-Profile PCI Adapter” on page 5-35
- “Replacing a PCI Riser Assembly and Its Adapters” on page 5-39
- “Removing and Inserting an Internal Hard Disk Drive” on page 5-45
- “Removing and Replacing a DVD Drive” on page 5-46
- “Replacing or Installing a Modem Assembly” on page 5-49
- “Removing and Replacing a PDU” on page 5-52

See the *ftScalable Storage: Operation and Maintenance Guide* (R600) for information about removing and replacing CRUs in an ftScalable Storage system.

Before Replacing CRUs

Working on the physical system can expose electronic components to potential damage from electrostatic discharge (ESD). Whenever working on a system:

- Use ESD precautions.
- Use the proper tools, if the procedure calls for them.
- Observe all Notes, Cautions, and Warnings.

Estimated Times

The estimated time given for each procedure includes only the approximate time needed to complete the physical removal and replacement of the components in question. It does not include the time that may be required to run necessary software commands or to return the system to its original operating order.

Actual times may vary from installation to installation.

Using ESD Precautions

CAUTION

To avoid damaging ESD-sensitive components during handling, always take the following precautions.

1. Ground yourself before working inside an enclosure. Put a grounding strap on your wrist and attach its other end to some suitable grounding point, such as a computer-system cabinet.
2. Discharge static electricity by touching an unpainted portion of the enclosure or system just before handling ESD-sensitive parts.
3. Store PCI adapters in their static-protective envelope until you are ready to install them in the system.
4. Hold a PCI adapter by its edges.

Observing Cautions and Warnings

Observe the following warnings, cautions, and notes.

WARNING

If a component is not a CRU, do not attempt to remove or replace it. Doing so may result in serious personal injury and/or damage to the system.

WARNING

Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions provided with the battery.

CAUTION

When replacing a CRU, always observe the following guidelines.

- Do not remove a CRU when its safe-to-remove LED is blinking. This indicates that the CRU is operating in simplex mode (its duplex partner is not functional). Removing the CRU would cause the system to fail.
- When necessary, see your system administration documentation for instructions in how to identify a failed component and take it offline before servicing it.
- Read the **entire** procedure so that you fully understand it. If any part of the procedure is not clear, see "Getting Help" in the Preface.

NOTES

1. A quick-reference diagram on the inside of each CPU-I/O enclosure cover labels the internal components of the enclosures. Refer to the diagram when replacing a CRU to determine the route of cables from the CRU to the connectors on the main board of the enclosure.
2. For some procedures, you take a single CPU-I/O enclosure offline. For others, you take both CPU-I/O enclosures offline at the same time. In those cases, you must shut down the system before performing the procedure.
3. When taking both CPU-I/O enclosures offline at the same time, you must schedule downtime to shut down the system.

Tools

Although you can replace some CRUs without the use of tools, others call for the use of a number 2 or number 1 Phillips head or slot head screwdriver.

Removing the Bezel

The system has a removable bezel that attaches to the front of both CPU-I/O enclosures. See the following topics:

- "Removing the Bezel" on page 5-4
- "Replacing the Bezel" on page 5-5

Estimated time: One minute.

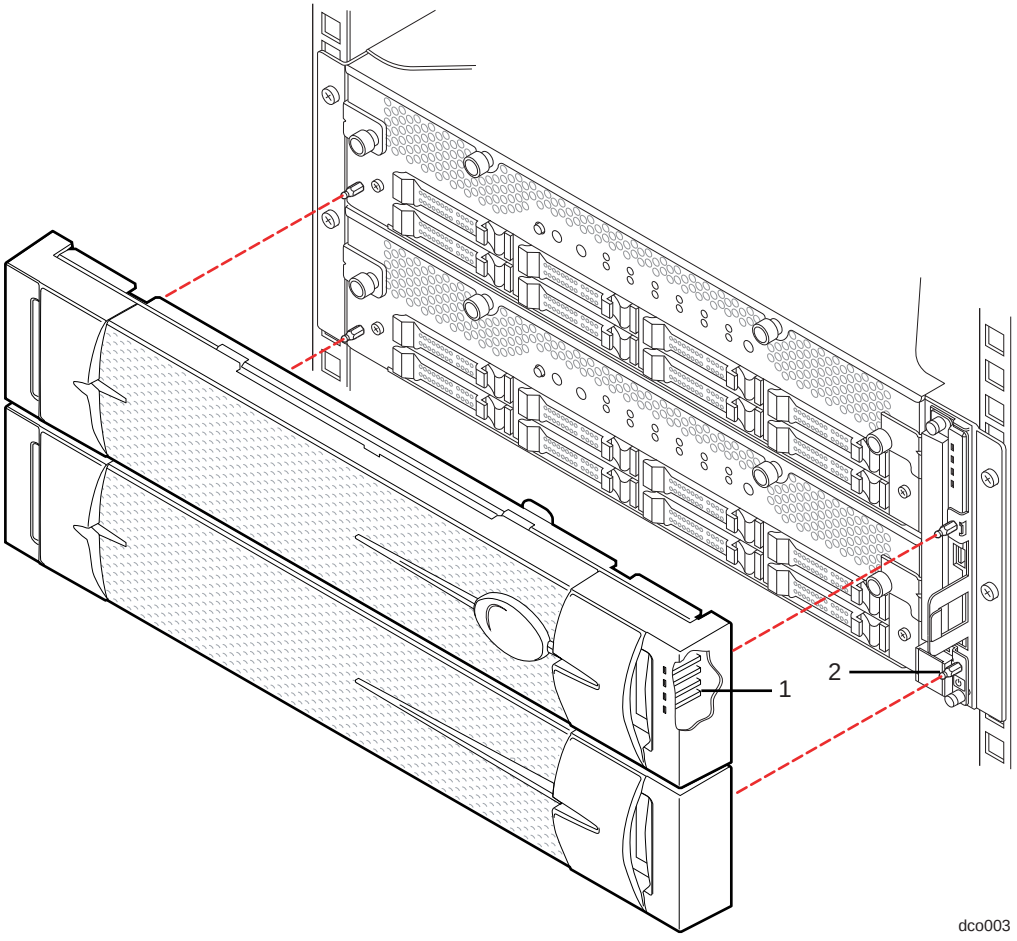
Tools: None.

Removing the Bezel

1. Grasp the bezel on its right and left sides.
2. Pull the bezel straight toward you until it snaps free from the ball studs (number 2 in Figure 5-1).

If you are replacing a defective bezel, set it aside for repacking. See "Repacking CRUs" on page 4-2.

Figure 5-1. Replacing the System Bezel



1 Light pipes (4)

2 Ball studs (4)

Replacing the Bezel

1. At the front of the system, align the bezel with its location on the system frame. Align the LED light pipes inside the bezel (shown through a cut-away view at number 1 in Figure 5-1) with the right side of the system.
2. Press the U-shaped openings on the inside of the bezel into the ball studs (number 2) on the mounting rails until the bezel snaps into place.

Removing and Replacing a Front Panel

Remove the front panel to replace it. Also, release it—but do not remove it—to replace the DVD drive. You do not need to power down the system or either CPU-I/O enclosure to remove and replace a front panel assembly. See the following topics:

- "Removing the Front Panel" on page 5-6
- "Replacing the Front Panel" on page 5-8

Estimated time: Two minutes.

Tools: None.

Use ESD precautions when performing this procedure.

Removing the Front Panel

You do not need to turn the system off when removing or replacing a front panel.

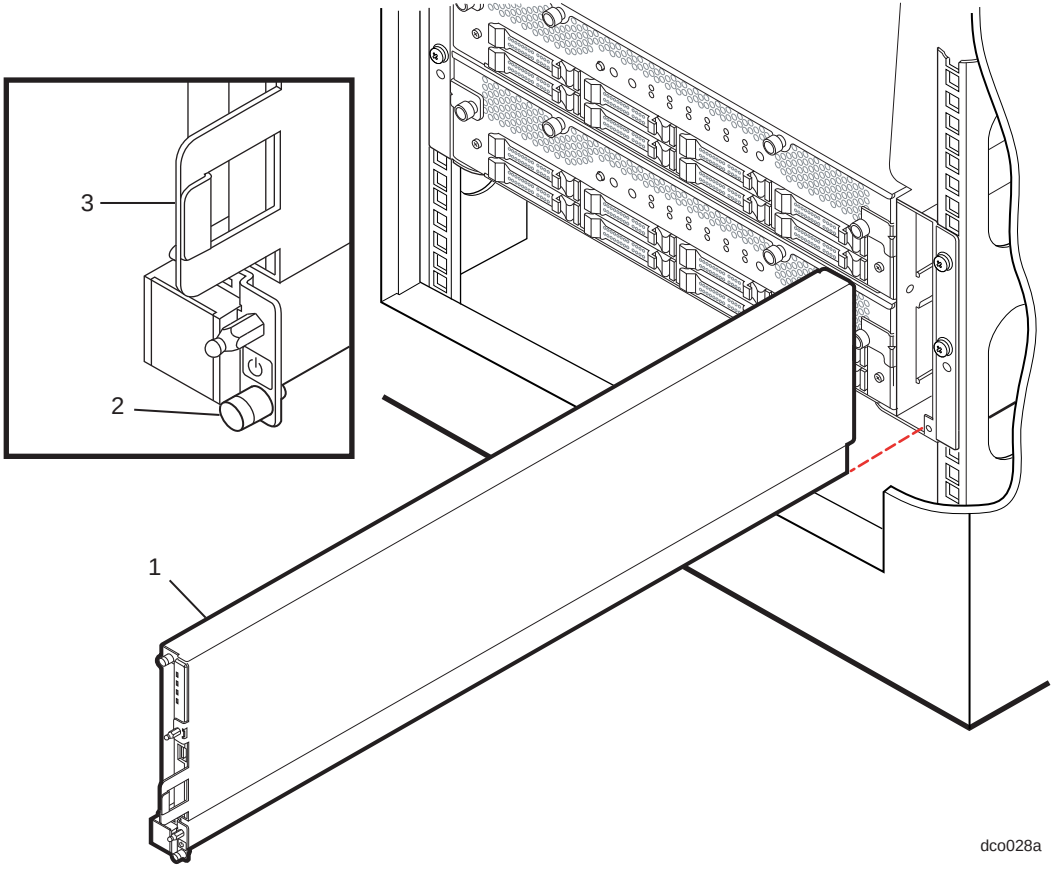
The replacement front panel does not include a DVD drive. You must remove the DVD drive from the defective front panel and install it in the replacement front panel.

CAUTION

The DVD drive is **not** hot-pluggable: Remove and replace the DVD drive only while the front panel is **disconnected** from the system backplane.

1. Remove the bezel.
2. Loosen the captive thumbscrew (number 2 in Figure 5-2) at the bottom of the front panel (number 1).

Figure 5-2. Replacing the Front Panel



1 Front panel
2 Captive thumbscrew
3 Bracket

3. Gripping the bracket (number 3) on the right side of the panel, pull the front panel straight out of its slot.
4. With the front panel disconnected from the system backplane, remove the DVD drive, as described in “Removing a DVD Drive” on page 5-47.

Replacing the Front Panel

1. With the front panel disconnected from the system backplane, install the DVD drive you removed from the defective front panel into the replacement front panel, as described in “Replacing a DVD Drive” on page 5-48.
2. Align the front panel as shown in Figure 5-2 and push it straight into the slot.
3. Tighten the captive thumbscrew (number 2) at the bottom of the panel.
4. Replace the bezel.

Removing and Replacing a CPU-I/O Enclosure

Remove a CPU-I/O enclosure to replace it or to access its internal components for other procedures. See the following topics:

- “Removing a CPU-I/O Enclosure” on page 5-8
- “Replacing a CPU-I/O Enclosure” on page 5-12

Estimated time: Five minutes.

Tools: None.

Use ESD precautions when performing this procedure.

Removing a CPU-I/O Enclosure

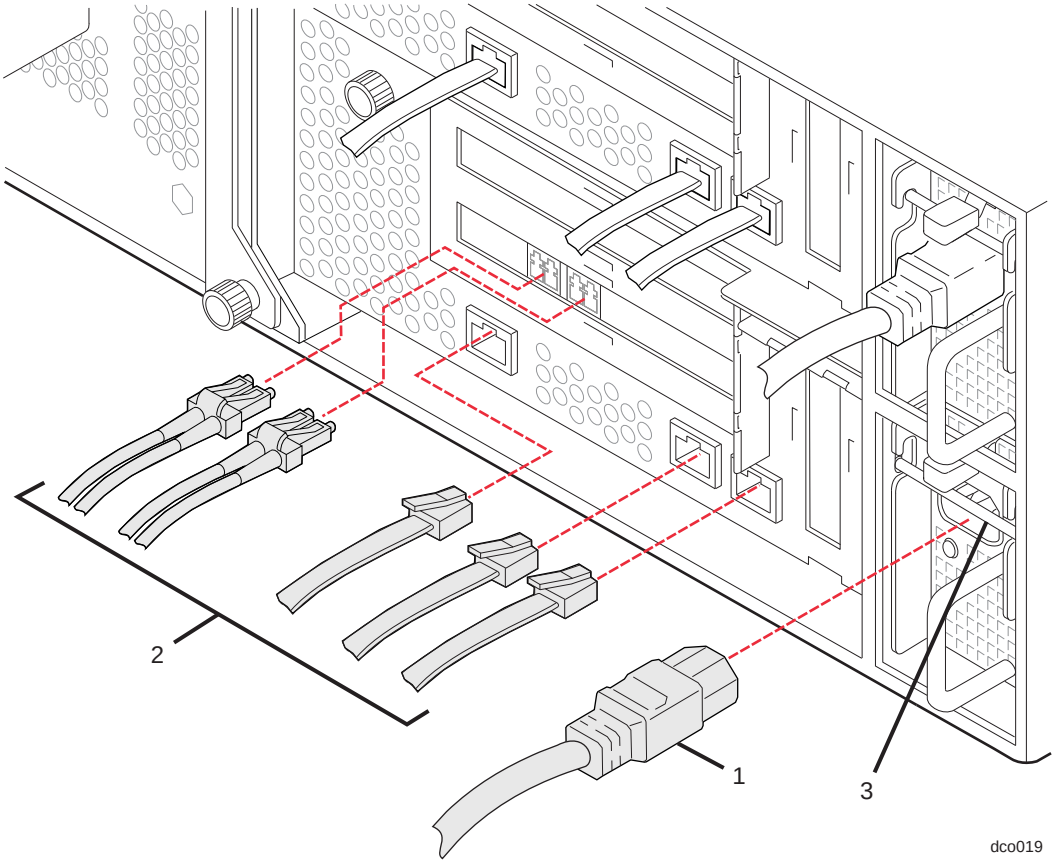
This procedure assumes that you are removing only one CPU-I/O enclosure and that the other enclosure is operating. If you remove both of the CPU-I/O enclosures in a system, you must shut the system down before performing this procedure.

WARNING

To avoid personal injury or damage to the system, two persons are required to replace an enclosure.

1. Verify that the enclosure is offline before proceeding. If necessary, use system management software to take the enclosure offline. See your system administration documentation for detailed instructions.
2. Remove the bezel.
3. Disconnect all data cables (number 2 in Figure 5-3) from the rear of the enclosure.
4. Disconnect and remove the power cord (number 1).

Figure 5-3. Disconnecting a CPU-I/O Enclosure



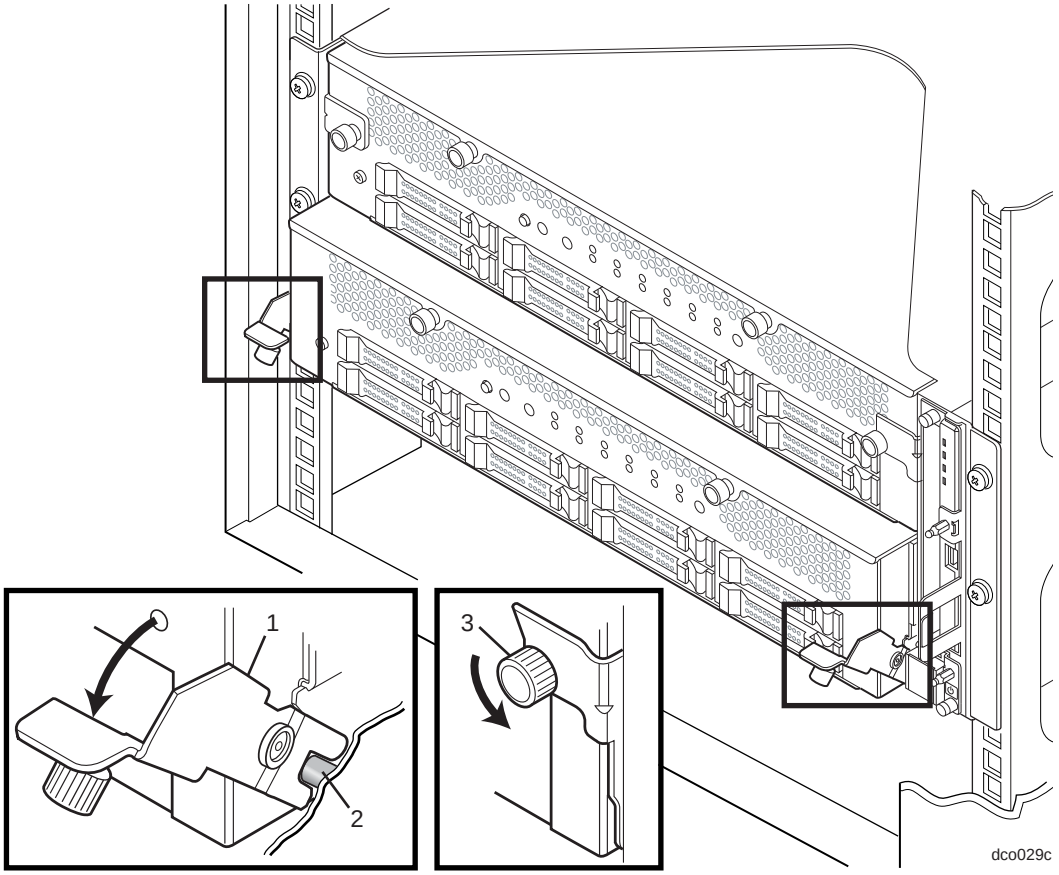
1 Power cord

2 Data cables

3 Power-cord locking bar

5. Loosen the thumbscrews (number 3 in Figure 5-4) on the release levers (number 1) at the front of the enclosure.
6. Pull the two release levers down to disengage them from the positioning pins (number 2) and to loosen the enclosure from the rails. Pull the enclosure a few inches out of the slot.

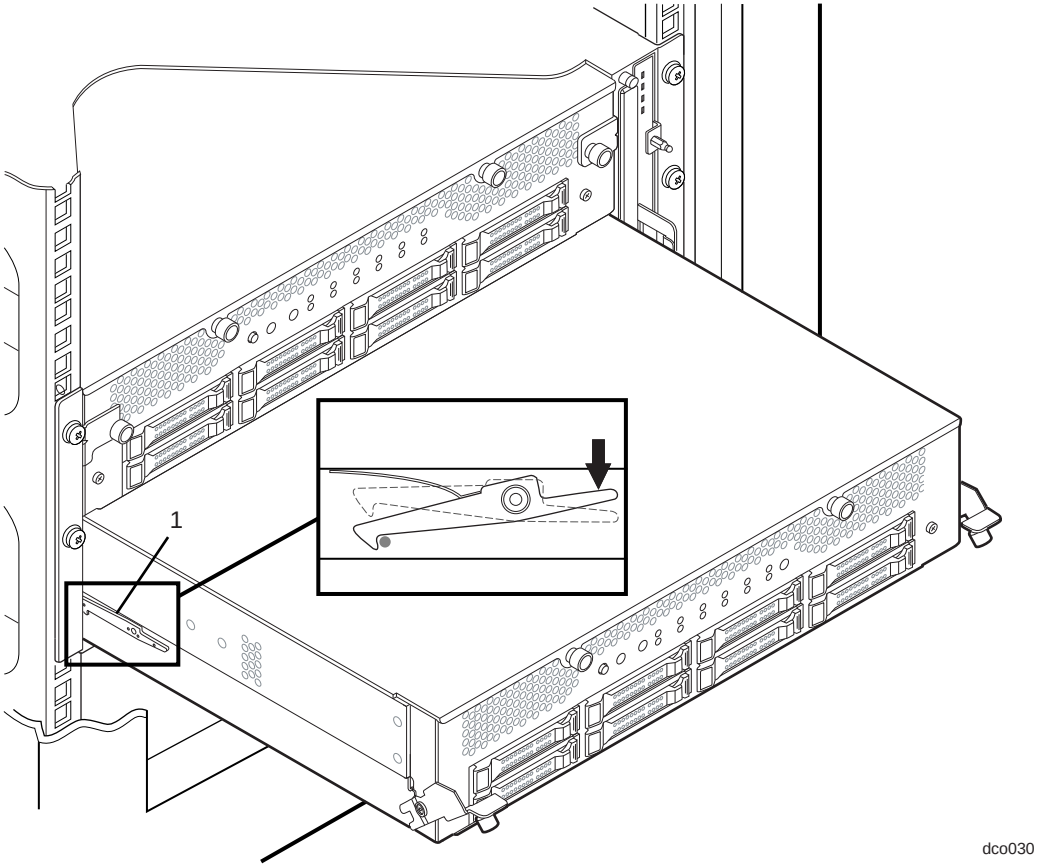
Figure 5-4. Loosening the Front Release Levers on an Enclosure



1	Release levers (unlocked) (2)	3	Thumbscrews (2)
2	Positioning pins (2)		

7. With one person supporting the enclosure on each side, pull it straight out until it is stopped by the safety lever (number 1 in Figure 5-5) on its left side. Push down the front end of the lever to disengage it.

Figure 5-5. Disengaging the Safety Lever on an Enclosure



1 Safety lever (1)

8. With each person holding a side of the enclosure, pull the enclosure straight out and place it on a flat, stable surface.
9. If you are replacing the CPU-I/O enclosure with a new enclosure, transfer the hard disk drives and the full-height or low-profile PCI adapters from the old enclosure to the new enclosure.

NOTES

1. The replacement enclosure will contain the same CPU and memory configuration as the enclosure you are replacing. Do not remove processors or memory modules from the enclosure when you return it to Stratus or a vendor.
2. Before you remove the disk drives from the old enclosure, label the drives on the bezel of each drive to ensure that you can replace them in the proper order. The numerical slot designation for each disk is noted on the front of the drive bay.

When you are finished removing components from the old CPU-I/O enclosure, set it aside for repacking. See "Repacking CRUs" on page 4-2.

Replacing a CPU-I/O Enclosure

NOTES

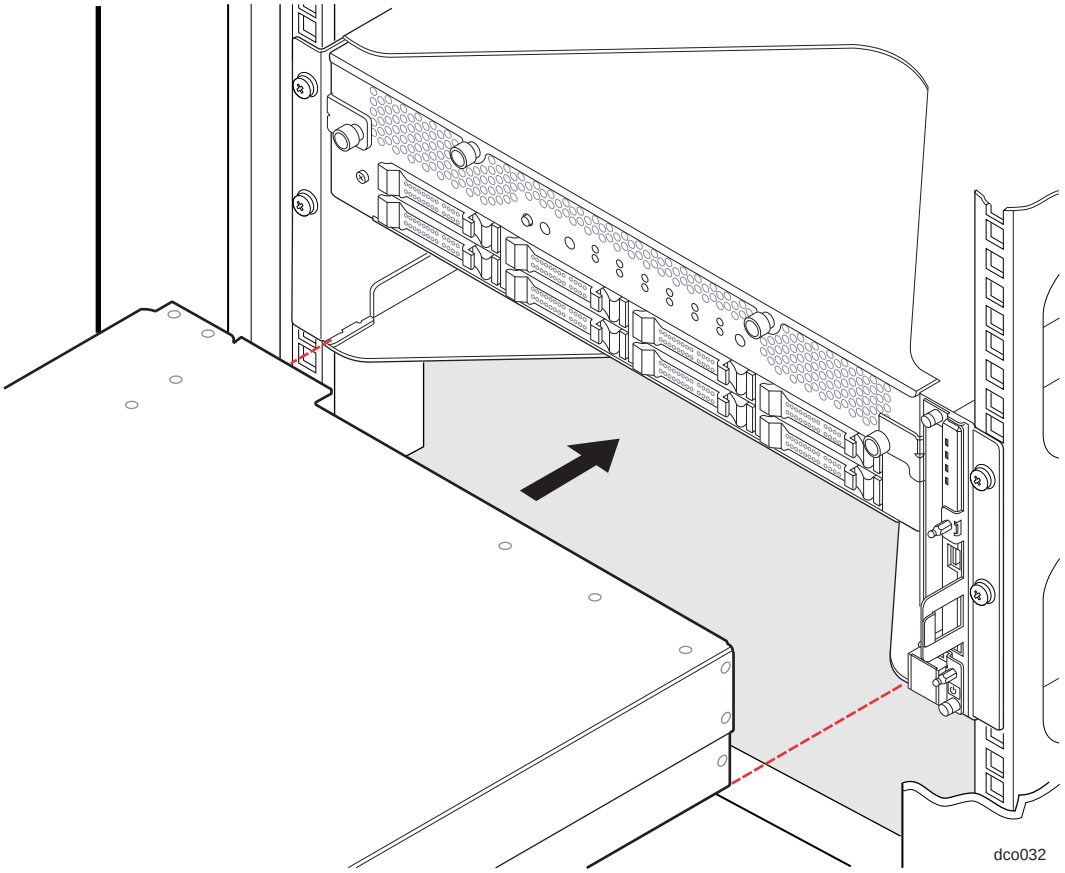
1. If replacing both CPU-I/O enclosures, be aware that the first CPU-I/O enclosure to complete power up is the *primary* (boot) or *active* enclosure: its PRIMARY LED will be lit.
2. Each CPU-I/O enclosure is identical (except possibly for the single tape controller that may be installed) and may occupy either of the two enclosure slots.

WARNING

To avoid personal injury or damage to the system, two persons are required to replace an enclosure.

1. With one person supporting the enclosure on each side, align the rear end of the enclosure with the appropriate rails on both sides (Figure 5-6). Keep the enclosure level.

Figure 5-6. Aligning the CPU-I/O Enclosure

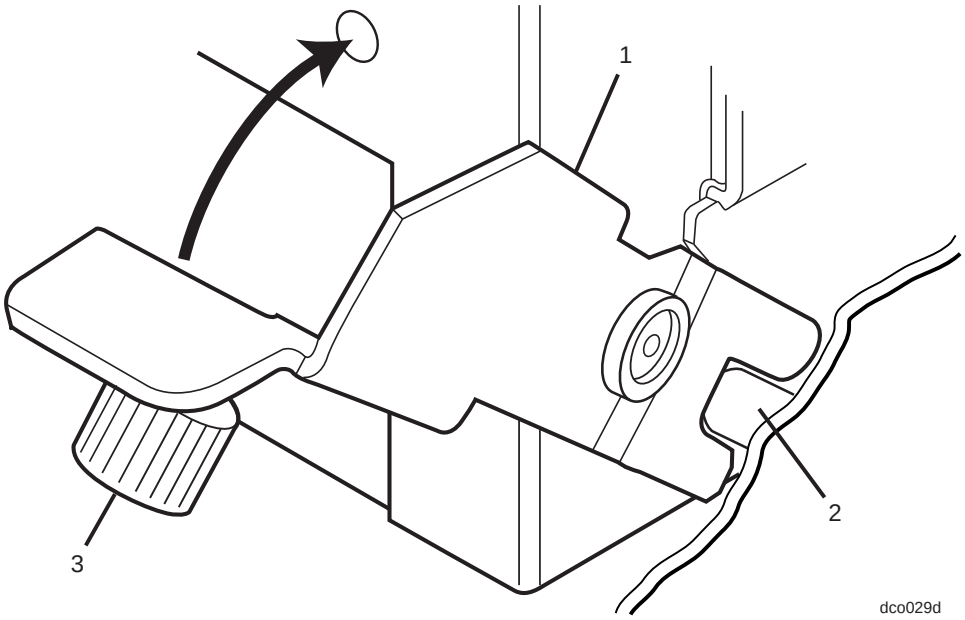


2. With the release levers in the open position (front end of lever pushed down), slide the enclosure **almost** all the way into its opening.
3. Position the lower ends of the release levers (number 1 in Figure 5-7) over the inside edge of the positioning pins (number 2), and push the release levers into their fully-closed position to push the enclosure into place.

CAUTION

Be sure to press the release levers flush against the front of the system before tightening the thumbscrews; otherwise, the thumbscrew threads will be stripped. You should feel two points of resistance as you press the release levers into the fully flush position.

Figure 5-7. Engaging the Release Levers on an Enclosure



1	Release lever (2)	3	Thumbscrew (2)
2	Release lever end over positioning pin (2)		

4. Tighten the two thumbscrews (number 3) to lock the enclosure securely into the backplane.
5. Connect the power cord (number 1 in Figure 5-3), lifting the power-cord locking bar (number 3 in Figure 5-3) to move the power cord into position. The enclosure returns to service if the other enclosure is operating.
6. Connect all the data cables (number 2 in Figure 5-3).

   If you shut down the system, return it to operation.

CAUTION

When you plug the power cord into the CPU-I/O enclosure, its green SAFE TO PULL LED will blink for about 30 seconds while its integrated BMC is synchronizing. **Do not remove the enclosure during this process.** If the LED continues to blink for several minutes, contact the CAC or your authorized Stratus service representative.

NOTE

When you return an enclosure to service, it resynchronizes itself with the active enclosure to return the system to duplexed operation. During this brownout period in VMware Systems, system performance may be sluggish for several minutes. Following the brownout, the system enters a blackout period for several seconds, during which system activity ceases, including VMotion migrations and network connections. You can manage the impact of CPU resynchronization by deferring bringup of the enclosure until a maintenance period. See the *Stratus ftServer System Administrator's Guide for VMware vSphere* (R002E) for information about scheduling CPU bringup options.

7. Ensure that the enclosure and any CRUs you replaced are functioning properly.

   Using system management commands, verify that all installed options appear in the system inventory and, if applicable, that they are operating in **Duplex** mode.

   On systems running ftServer System Software for the Windows Operating System, it could take the system several minutes to update the status of all the devices in ftSMC, particularly for mirrored disk drives. If the system was out of duplex operation for more than 30 minutes, the disks undergo full resynchronization, which can take several hours.

   On Windows systems, you can run diagnostics to verify that the Ethernet PCI adapters have a link and are actively passing packets. For information about using the Intel PROSet tool (also known as Advanced Network Services) to troubleshoot and configure Ethernet adapters, see the *Stratus ftServer System Administrator's Guide for the Windows Operating System* (R014W).

If any devices are not functioning properly, verify that you properly installed all of the data cables. If the cabling is correct, refer to the system administrator's guide for your system for troubleshooting information.

8. Replace the bezel.

Removing and Replacing a CPU-I/O Enclosure Cover

Remove the cover of a CPU-I/O enclosure to access the CRUs located within it. See the following topics:

- "Removing an Enclosure Cover" on page 5-16
- "Replacing an Enclosure Cover" on page 5-17

Estimated time: Six minutes.

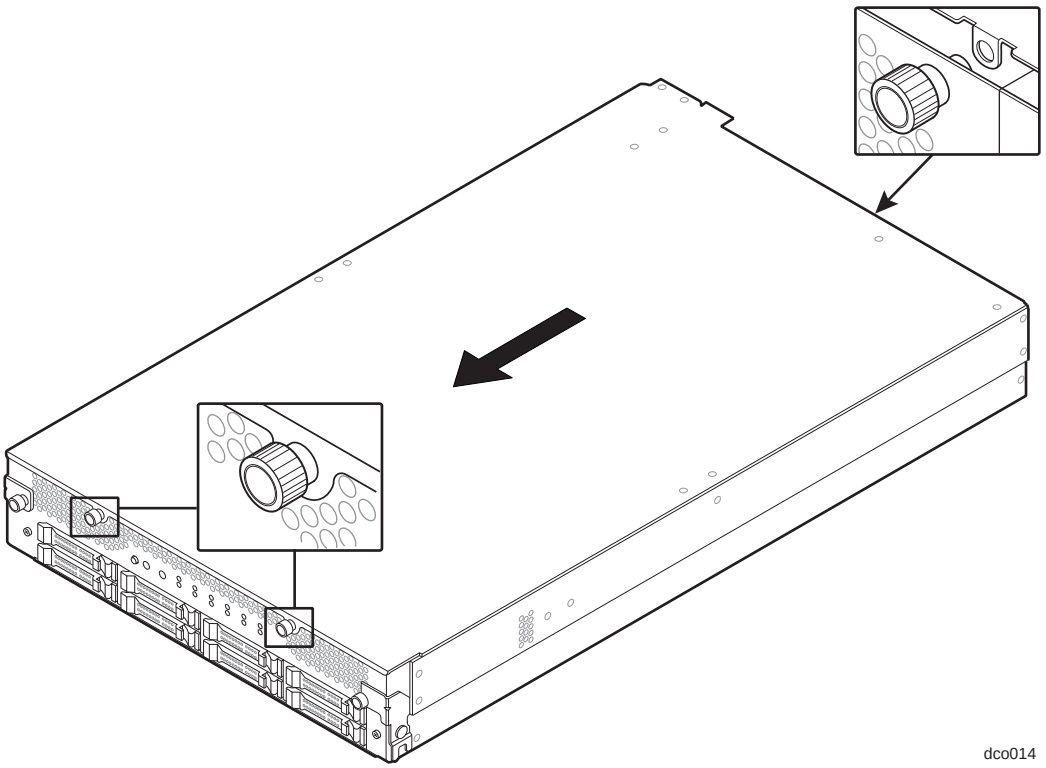
Tools: None.

Use ESD precautions when performing this procedure.

Removing an Enclosure Cover

1. Remove the bezel.
2. Remove the CPU-I/O enclosure and place it on a flat, stable surface.
3. Loosen the two thumbscrews at the front and the single thumbscrew at the rear of the cover (see highlighted areas of Figure 5-8).

Figure 5-8. Removing an Enclosure Cover



4. Slide the cover toward the front of the enclosure slightly, pulling on the thumbscrews and placing a finger in the opening at the rear of the cover for added grip, if necessary.
5. Lift the cover straight upwards to remove it.

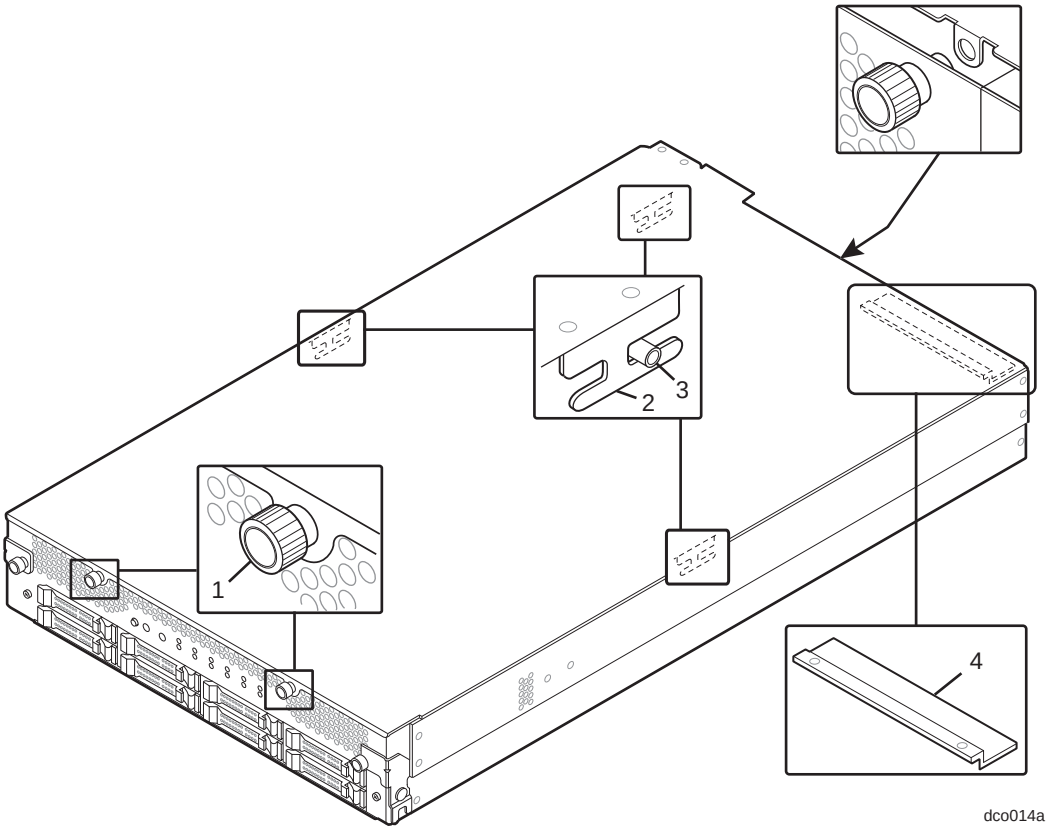
Replacing an Enclosure Cover

1. Place the cover on top of the enclosure, with about 0.5 in. (1.3 cm) of the cover overhanging the front of the enclosure.

   Make sure that the cover's thumbscrews (number 1 in Figure 5-9) are toward the front of the enclosure, and that the side with the tabs (number 2) is on the bottom.

2. Slide the right and left edges of the cover inside the edges of the enclosure, lining up the tabs on the bottom of the cover (number 2) with the guide pins (number 3) located at the sides of the enclosure interior.

Figure 5-9. Replacing an Enclosure Cover



1	Thumbscrews (2 on front, 1 on back)	3	Guide pins (2)
2	Tabs (2)	4	Raised slot (1)

3. Slide the cover toward the rear of the enclosure, while guiding the tabs over the guide pins.
4. Guide the cover so that its raised slot (number 4) sandwiches the returning edge of the rear of the enclosure for a tight fit.

   If necessary, press down on the cover near the rear of the enclosure as you push the cover firmly into place.

5. Tighten the two thumbscrews at the front of the enclosure and the one at the back.
6. Replace the CPU-I/O enclosure and the bezel.

Removing the Plenum

The plenum is an air baffle that you must remove to access the DIMMs, the CPU-I/O enclosure power supply, or the CPU-I/O enclosure fans. See the following topics:

- "Removing the Plenum" on page 5-19
- "Replacing the Plenum" on page 5-20

Estimated time: Seven minutes.

Tools: Phillips head number 2 screwdriver.

Use ESD precautions when performing this procedure.

Removing the Plenum

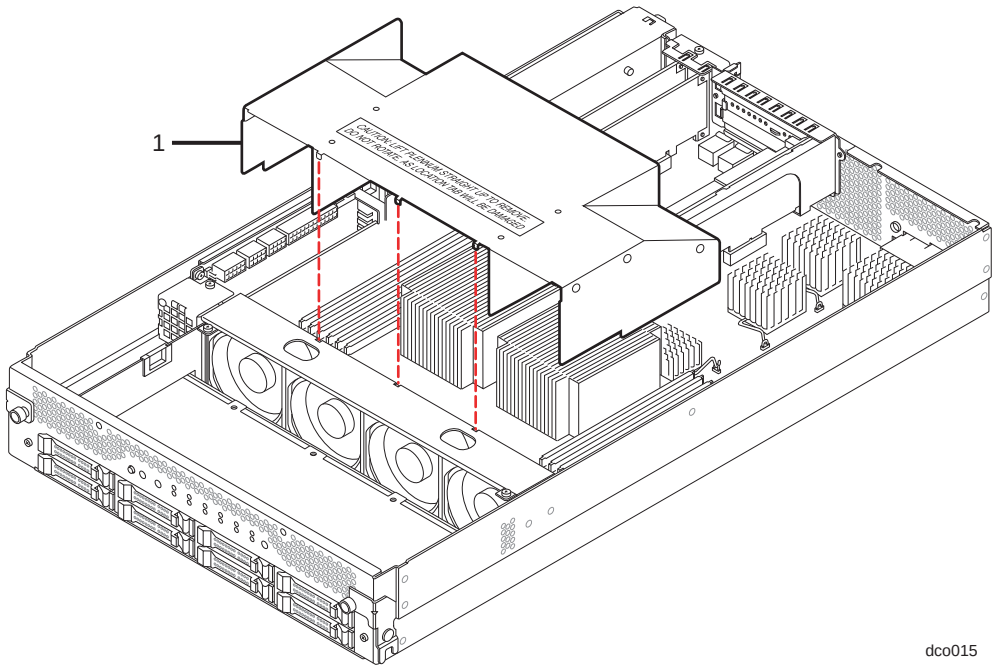
1. Remove the bezel, CPU-I/O enclosure, and CPU-I/O enclosure cover.

   CAUTION

   Do not rotate the plenum when removing it. Lift it straight up to avoid damaging its front tabs.

2. Lift the plenum (number 1 in Figure 5-10) straight out of the enclosure, pulling on its lower sides to free them from their settings, if necessary.

Figure 5-10. Replacing the Plenum



1 Plenum

Replacing the Plenum

1. Place the plenum as shown in Figure 5-10 and lower it into position until it snaps into place.

   To seat the plenum properly, slide its sides over the outside of the DIMM slots, and fit its three tabs into the fan assembly.

2. Replace the CPU-I/O enclosure cover, CPU-I/O enclosure, and bezel.

Replacing the System Backplane Assembly

To replace a system backplane assembly, you must disconnect it from both CPU-I/O enclosures. You must also remove the modem assembly from the backplane assembly to install it on the replacement system backplane assembly.

NOTE

Because you remove both enclosures from operation to replace a system backplane assembly, you must schedule downtime to shut down the system.

See the following topics:

- "Removing the System Backplane Assembly" on page 5-21
- "Replacing the System Backplane Assembly" on page 5-23

On Linux systems, examine the network configuration files before you bring down the system to replace the backplane.

1. Examine each embedded Ethernet PCI adapter's network configuration file and delete the entry `MACADDR=`*`xx`*`:`*`xx`*`:`*`xx`*`:`*`xx`*`:`*`xx`*`:`*`xx`* (where *xx* represents hexadecimal address digits) if it is present. The network configuration files are found in `/etc/sysconfig/network-scripts`. See your system administration documentation for the names of the embedded Ethernet PCI network configuration files, which reflect the device names.
2. If an embedded Ethernet PCI adapter's network configuration file contains the keyword `MASTER=`*`bondname`*, examine the network configuration file for the *`bondname`* adapter for the entry `MACADDR`. Delete the line containing the `MACADDR` entry in the `ifcfg-bondname` file.

Estimated time: Fifteen minutes

Tools needed: None

Use ESD precautions when performing this procedure.

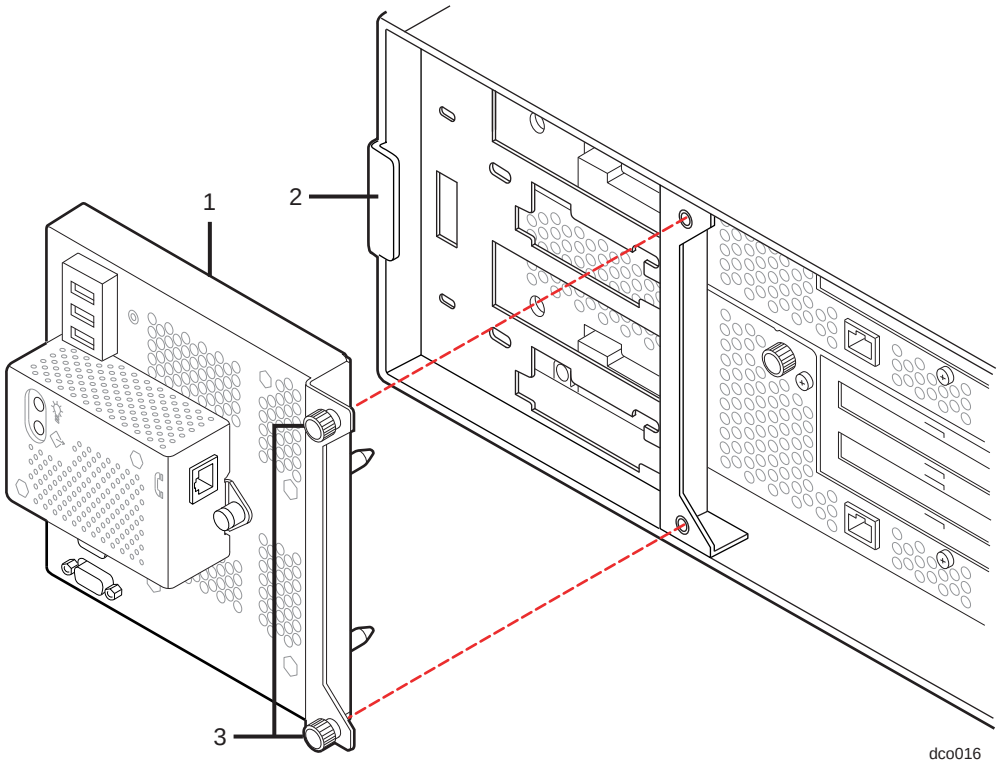
Removing the System Backplane Assembly

1. Shut down the system.
2. Remove the bezel.
3. Disconnect any cables from the system backplane.
4. **Release**, but do not remove, **each** CPU-I/O enclosure from the system chassis, as follows:
   a. Disconnect all data cables (number 2 in Figure 5-3), being sure to label each one in order to reinstall each later in its proper place.
   b. Disconnect the power cord (number 1 in Figure 5-3).
   c. Loosen the two thumbscrews (number 3 in Figure 5-4) on the release levers at the front of the enclosure.

d. Pull the two release levers to loosen the enclosure from the rails. Pull the enclosure out about 4 in. (10 cm) to separate it from the backplane. Do not remove the enclosures from the rails.

5. Slide the front panel about 4 in. (10 cm) out of the enclosure, as follows:
   a. Referring to Figure 5-2, loosen the captive thumbscrew (number 2) at the bottom of the front panel (number 1).
   b. Gripping the bracket (number 3) on the right side of the panel, pull the front panel straight out of its slot.
6. If a modem is installed, remove it from the system backplane, as follows:
   a. Disconnect the phone line connector (number 3 in Figure 5-27) from the modem assembly.
   b. Loosen the two captive screws (number 2 in Figure 5-27) that fasten the modem assembly to the system backplane assembly.
   c. Disconnect and remove the modem assembly by pulling it gently off the system backplane assembly.
7. Loosen the two thumbscrews (number 3 in Figure 5-11) on the right side of the system backplane assembly (number 1).
8. Slide the system backplane assembly to the right, out from beneath the retaining tab (number 2), and pull the assembly out of the system.

Figure 5-11. Replacing the System Backplane Assembly



1	System backplane assembly	3	System backplane thumbscrews
2	Retaining tab		

N O T E

If the system backplane assembly does not slide, pull the enclosures a little further out of the system chassis.

If the system backplane assembly is defective, set it aside for repacking. See “Repacking CRUs” on page 4-2.

Replacing the System Backplane Assembly

1. Line up the new system backplane assembly with the system chassis, as shown in Figure 5-11. (The USB connectors are located on the upper left side of the assembly.)

2. Insert the system backplane assembly into the enclosure, then slide it to the left and beneath the retaining tab (number 2 in Figure 5-11).

   The thumbscrews (number 3) on the assembly should line up with the screw holes on the rear of the enclosure.

3. Tighten the two thumbscrews on the system backplane assembly to fasten it to the system chassis.
4. Replace the power cord on each CPU-I/O enclosure.
5. If there is a system modem, attach it to the new system backplane assembly, as follows:
   a. Press the modem assembly firmly into the connector (Figure 5-27). The modem connector is keyed to fit only the correct way.
   b. Tighten the two captive screws (number 2 in Figure 5-27) on the modem assembly to fasten it to the system backplane assembly.
   c. Connect the phone line (number 3 in Figure 5-27) to the connector on the modem assembly.

   CAUTION

   Do not enable the modem until it is securely connected to the backplane.

6. Connect all of the cables to the system backplane assembly.
7. Return each CPU-I/O enclosure to its fully inserted position and tighten the thumbscrews on the release levers.
8. Return the front panel to its fully inserted position and tighten its thumbscrew.
9. If you removed the CPU-I/O enclosure data cables, reconnect them.
10. Start the system.
11. Replace the bezel.

On Windows systems, when you replace a system backplane assembly with a new assembly, you need to reset the Ethernet address (also known as the MAC address) of any Ethernet team that includes embedded Ethernet PCI adapters. In addition, your network administrator must update any network filtering or security settings that might be based on the Ethernet addresses of any embedded Ethernet adapter, teamed or non-teamed. For information about updating the Ethernet address of Ethernet teams, see the ftServer system administrator's guide. Also, a document shipped with every replacement system backplane describes the required actions.

Replacing and Adding DIMMs

You install DIMMs when either upgrading system memory or replacing a faulty DIMM. See the following topics:

- "Upgrading System Memory" on page 5-25
- "Installing DIMMs" on page 5-29
- "Replacing a Faulty DIMM" on page 5-29

Upgrading System Memory

CAUTION

When adding DIMMs, if you require help from the CAC or your authorized Stratus service representative, you will incur costs and you may void your system's warranty. Unless you have been trained to replace DIMMs, upgrading a system's CPU-I/O enclosures offers a lower-risk way of increasing system memory.

When upgrading system memory, you must maintain the same total memory size in each CPU-I/O enclosure. For example, if CPU element 0 has 96 gigabytes (GB), CPU element 1 must have 96 GB.

Each slot in an enclosure must contain the same-sized DIMM as the corresponding slot in the other enclosure. For example, if slot 1 in CPU element 0 has 8 GB, then slot 1 in CPU element 1 must have 8 GB.

Within an enclosure, different slots can contain different-sized DIMMs. For instance, slot 1 in CPU elements 0 and 1 can have 4 MB, and slot 2 in CPU elements 0 and 1 can have 8 GB.

The DIMMs in the slots can be from different manufacturers, but they must be supplied by Stratus.

NOTE

The CPU-I/O enclosures are numbered CPU element 0, I/O element 10, and CPU element 1, I/O element 11, and the processsor slots within each enclosure are numbered CPU 1 and CPU 2.

Memory in Single-Processor Systems

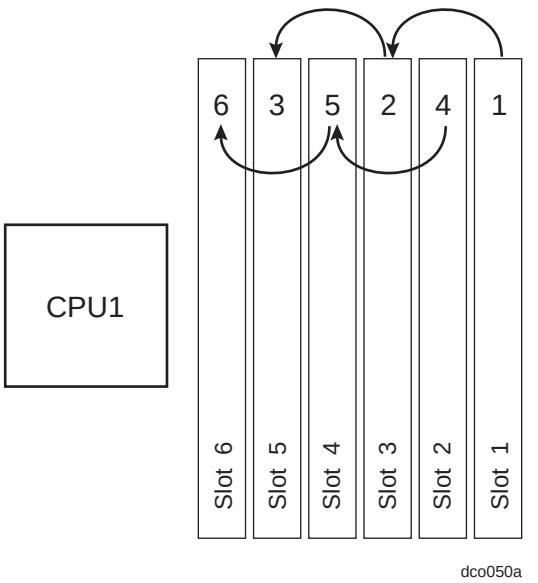
You install memory in single-processor systems (all ftServer 2600 systems and some ftServer 4500 systems) in the following slots in the sequence shown (see also Figure 5-12):

- slot 1, slot 3, slot 5, slot 2, slot 4, slot 6

NOTE

Refer also to the “map” of the system’s components that is located on the inside of the top cover of each CPU-I/O enclosure.

Figure 5-12. DIMM Slot Numbering in Single-Processor Systems (Viewed from Front)



Each DIMM slot in a CPU element may contain a DIMM of any supported size, but DIMMs of identical capacity must be mounted in the corresponding slots of each CPU-I/O enclosure.

For example, if slot 1 in CPU element 0 has 8 GB, then slot 1 in CPU element 1 must have 8 GB, and so on for all of the slots.

Memory in Dual-Processor Systems

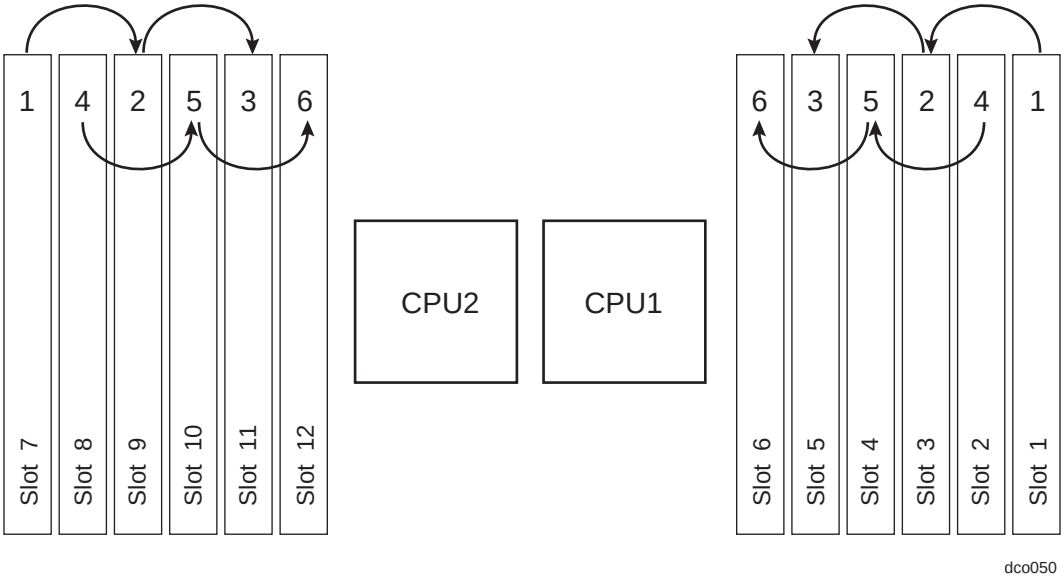
You install memory in dual-processor systems (some ftServer 4500 systems and all ftServer 6300 systems) in the following slots in the sequence shown (see also Figure 5-13):

- In CPU 1: slot 1, slot 3, slot 5, slot 2, slot 4, slot 6.
- In CPU 2: slot 7, slot 9, slot 11, slot 8, slot 10, slot 12.

NOTE

Refer also to the “map” of the system’s components that is located on the inside of the top cover of each CPU-I/O enclosure.

Figure 5-13. DIMM Slot Numbering in Dual-Processor Systems (Viewed from Front)



You must add the DIMMs in matching slot pairs, in the following sequence of slot numbers: 1 and 7, 3 and 9, 5 and 11, 2 and 8, 4 and 10, 6 and 12.

To upgrade system memory

Estimated time: Twenty minutes, but variable with the number of DIMMs to be installed and the number of processors per system.

Tools: Phillips head number 2 screwdriver.

Use ESD precautions when performing this procedure.

NOTE

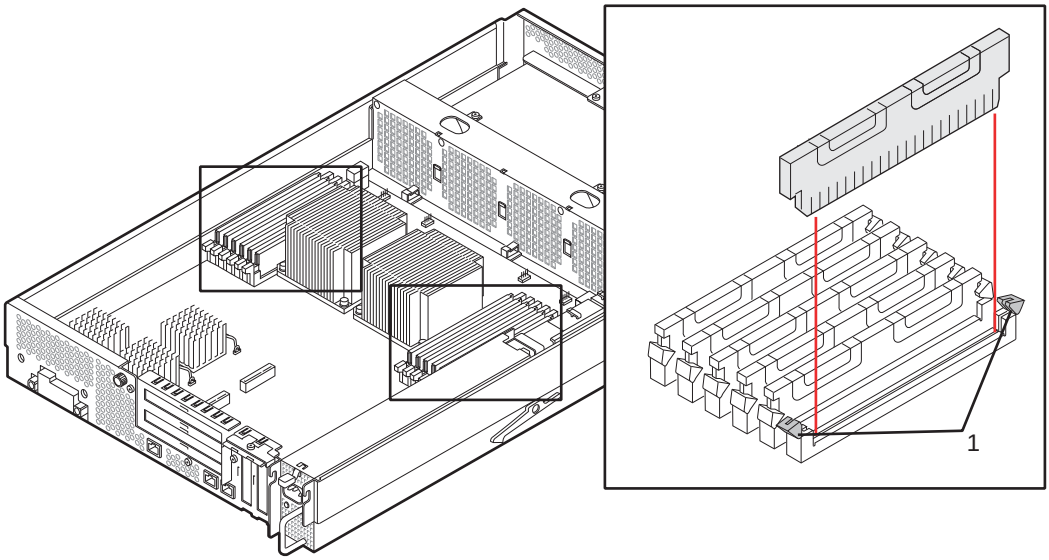
Because you remove both CPU-I/O enclosures from operation to upgrade system memory, you must schedule downtime to shut down the system.

1. Shut down the system.
2. Remove the bezel.
3. Remove both CPU-I/O enclosures.
4. Remove both CPU-I/O enclosure covers.
5. Remove both plenums.
6. Follow the procedure “Removing DIMMs” on page 5-28 if you need to remove any existing DIMMs.
7. To populate the system with the upgrade DIMMs, perform the procedure “Installing DIMMs” on page 5-29 in accordance with the restrictions described in either “Memory in Single-Processor Systems” on page 5-26 or “Memory in Dual-Processor Systems” on page 5-27, as appropriate.

Removing DIMMs

1. Push down on the ejector levers (Figure 5-14) at each end of the DIMM to be removed.

Figure 5-14. DIMM Ejector Levers



1 Ejector levers

2. Pull the DIMM up to remove it from the connector.

Installing DIMMs

1. With the DIMM connector ejector levers in the open position (down), align the small slots on the base of the DIMM with the notches at the base of the connector. Push the DIMM down firmly into place. Make sure it is fully seated.
2. Raise the connector's ejector levers to lock the DIMM firmly into place.
3. If you upgraded system memory, after installing all of the DIMMs, reinstall the plenums, CPU-I/O enclosure covers, CPU-I/O enclosures, including their cable and power connections, and return the system to operation.

   If you installed a DIMM in only one CPU-I/O enclosure, reinstall the plenum, CPU-I/O enclosure cover, and CPU-I/O enclosure, and return it to service.

Replacing a Faulty DIMM

Refer to the memory fault LEDs, shown in Figure 3-2 and described in Table 5-1, to identify the location of the faulty DIMM.

Table 5-1. Memory Fault LEDs

Memory Fault LEDs	DIMM Number	Memory Fault LEDs	DIMM Number
	0–No defective DIMM		7
	1		8
	2		9
	3		10
	4		11
	5		12
	6		15–Fault cannot be isolated to a specific DIMM.

To replace a faulty DIMM

If you must replace DIMMs in different enclosures, work on one enclosure at a time to keep the system operating.

Be sure that the system is duplexed before removing either enclosure.

1. Remove the bezel.
2. Remove the CPU-I/O enclosure.
3. Remove the CPU-I/O enclosure cover.
4. Remove the plenum.
5. Perform the procedure “Removing DIMMs” on page 5-28
6. Perform the procedure “Installing DIMMs” on page 5-29.

Removing and Replacing the CPU-I/O Enclosure Fan Assembly

Each CPU-I/O enclosure contains a four-fan assembly for cooling the CPU. See the following topics:

- "Removing the CPU-I/O Enclosure Fan Assembly" on page 5-31
- "Replacing the CPU-I/O Enclosure Fan Assembly" on page 5-33

Estimated time: Twelve minutes

Tools: Phillips head number 2 screwdriver.

Use ESD precautions when performing this procedure.

Removing the CPU-I/O Enclosure Fan Assembly

1. Remove the CPU-I/O enclosure.
2. Remove the CPU-I/O enclosure cover.
3. Remove the plenum.
4. Remove the two screws (number 2 in Figure 5-15) on the fan assembly (number 1).

CAUTION

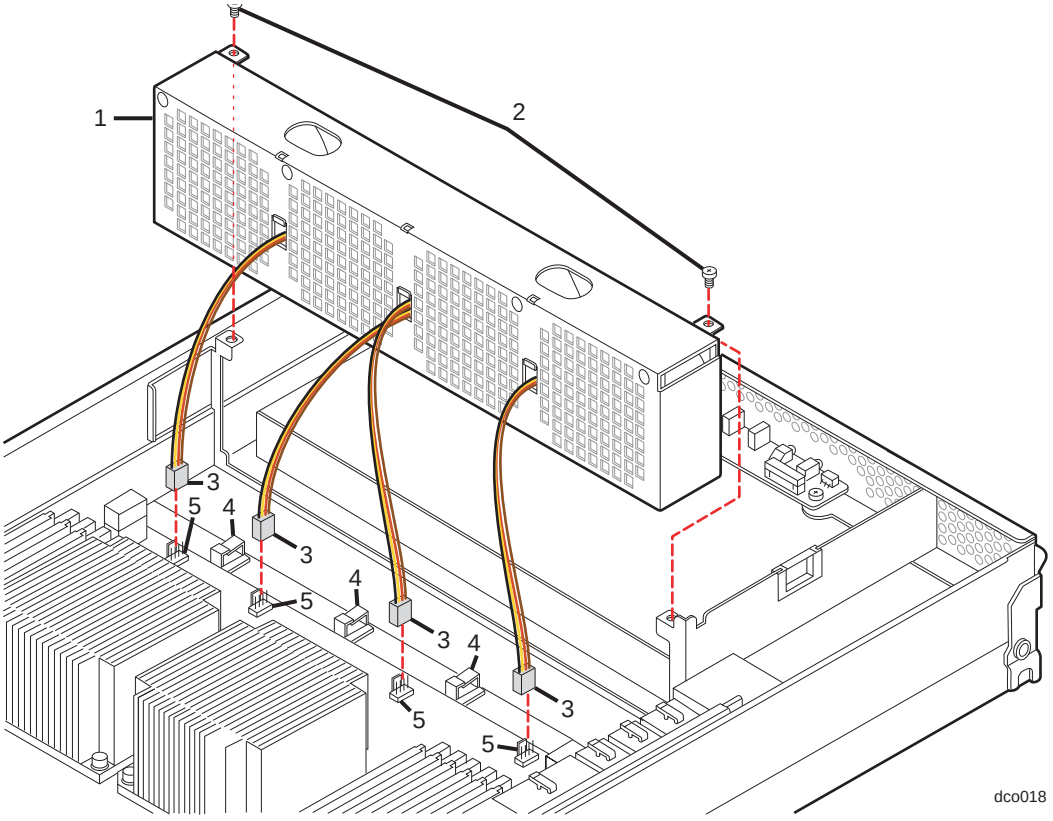
Before removing the fan-wire connectors (number 3 in Figure 5-15), be sure to note which fan-wire connector connects to which main-board connector (5), in order to install the replacement fan-wire connectors into the proper main-board connectors.

5. Pull straight up on the fan-wire connectors to disconnect the cable from the main-board connectors.

NOTE

Pull the connector, not the wires, to disconnect the wires.

Figure 5-15. Replacing the CPU-I/O Enclosure Fan Assembly



1	CPU-I/O enclosure fan assembly	4	Plastic cable retainers (3)
2	Screws (2)	5	Main board connectors (4)
3	Fan-wire connectors (4)		

6. If necessary, open the three plastic cable retainers (number 4) and free the fan-wire connectors from the cable retainers.

   To open a plastic cable retainer, swivel the top clip of the retainer to one side and lift it into its open position.

7. When the fan wires are separated from the cable retainers, pull the fan assembly straight up to remove it.

Replacing the CPU-I/O Enclosure Fan Assembly

1. Align the new CPU-I/O enclosure fan assembly as shown in Figure 5-15 and lower it into place. Be sure that no cables or wires remain beneath the fan assembly.

   You may have to maneuver adjoining cables out of the way in order to move the fan assembly into its proper position.

2. Connect the four fan-wire connectors (number 3) to their appropriate main-board connectors (number 5).
3. If the fan wires need to be retained, tuck the fan-wire connectors into their respective plastic cable retainers and close the clips.
4. Replace the two screws (number 2 in Figure 5-15).
5. Reinstall the plenum, CPU-I/O enclosure cover, and CPU-I/O enclosure.

Removing and Replacing the Power Supply Fan

Each CPU-I/O enclosure contains one power supply fan. See the following topics:

- “Removing the Power Supply Fan Assembly” on page 5-33
- “Replacing the Power Supply Fan Assembly” on page 5-34

Estimated time: Twelve minutes.

Tools: Phillips head number 2 screwdriver.

Use ESD precautions when performing this procedure.

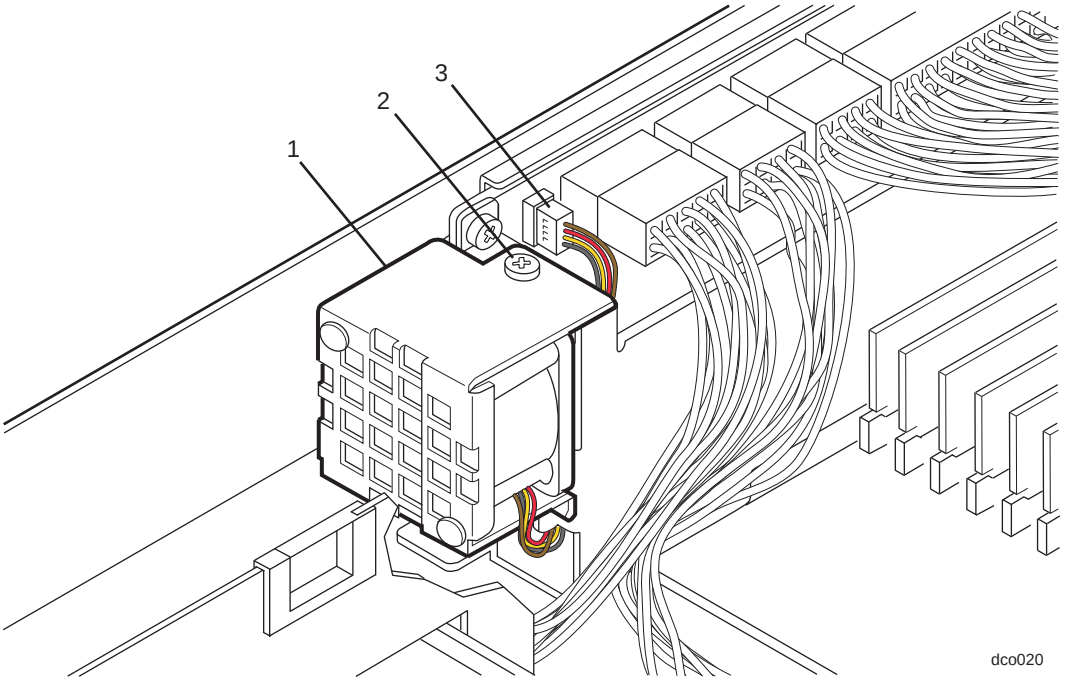
Removing the Power Supply Fan Assembly

1. Remove the CPU-I/O enclosure.
2. Remove the CPU-I/O enclosure cover.

   N O T E
   For the sake of clarity, Figure 5-16 does not show the plenum.

3. Remove the screw (number 2 in Figure 5-16) on the fan assembly (number 1). (If necessary, move the SAS disk cables—not shown in the figure—out of the way.)
4. Remove the fan connector (number 3) from the power backplane.
5. Lift the fan straight up and out of the enclosure.

Figure 5-16. Removing the Power Supply Fan



1 Power supply fan

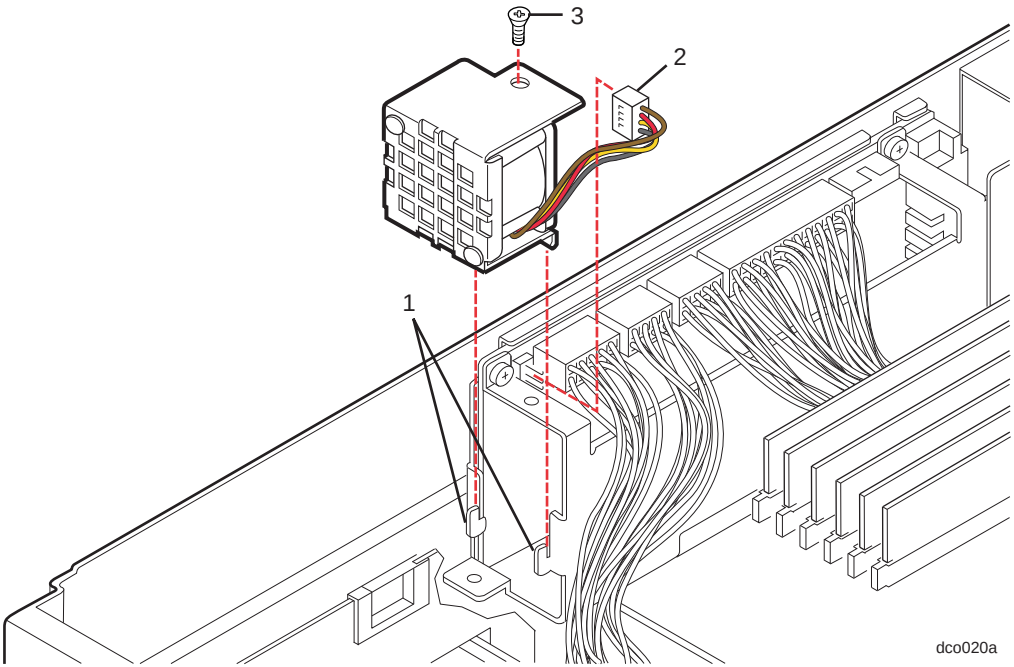
2 Screw

3 Fan connector

Replacing the Power Supply Fan Assembly

1. Lower the fan into place, being sure to guide its base over the tabs (number 1 in Figure 5-17). You may have to maneuver data cables to fit the fan into place.
2. Reconnect the connector (number 2) onto the power backplane.
3. Replace the screw (number 3) on the fan assembly.
4. Replace the CPU-I/O enclosure cover and CPU-I/O enclosure.

Figure 5-17. Replacing a Power Supply Fan



1 Tabs
2 Connector
3 Screw

Removing and Installing a Low-Profile PCI Adapter

You may need to replace defective PCI adapters or add new adapters to your system from time to time. See the following topics:

- “Removing a Low-Profile PCI Adapter” on page 5-36
- “Installing a Low-Profile PCI Adapter” on page 5-38

Also, see the *Stratus ftServer Systems: PCI Adapter Guide* (R461) for information related to the PCI adapter model you are installing.

If installing adapters in a PCI riser assembly, see “Replacing a PCI Riser Assembly and Its Adapters” on page 5-39.

Estimated time: Ten minutes.

Tools: Phillips head number 2 screwdriver.

Use ESD precautions when performing this procedure.

NOTES

1. The PCI slots are physically labeled PCI 1 through PCI 4 on the enclosure chassis. PCI slot identification in Windows software is the same as labeling in the hardware. For PCI slot identification in Linux and VMware ESX software, see the *Stratus ftServer System Administrator's Guide for the Linux Operating System* (R003L), the *Stratus ftServer System Administrator's Guide for VMware vSphere* (R002E), or the *Stratus ftServer Systems: PCI Adapter Guide* (R461).
2. No slots are reserved.
3. ftServer 4500 and 6300 systems may optionally have 4 PCI slots.
4. PCI slots 3 and 4 are located on a PCI riser assembly inside the CPU-I/O enclosure. See "Replacing a PCI Riser Assembly and Its Adapters" on page 5-39; that procedure also describes how to install PCI adapters on the riser.
5. Install only low-profile PCI-Express adapters in slots 1 and 2.
6. You cannot install full-height PCIe adapters in low-profile PCI slots. Install full-height and extra-long PCIe adapters only in PCI slots 3 and 4 on the optional PCIe riser assembly.
7. You can install PCI-X adapters only in PCI slots 3 and 4 on the optional PCI-X riser assembly.
8. For information about replacing an Ethernet PCI adapter that is part of a port group (VMware ESX systems), see the *Stratus ftServer Systems: PCI Adapter Guide* (R461).

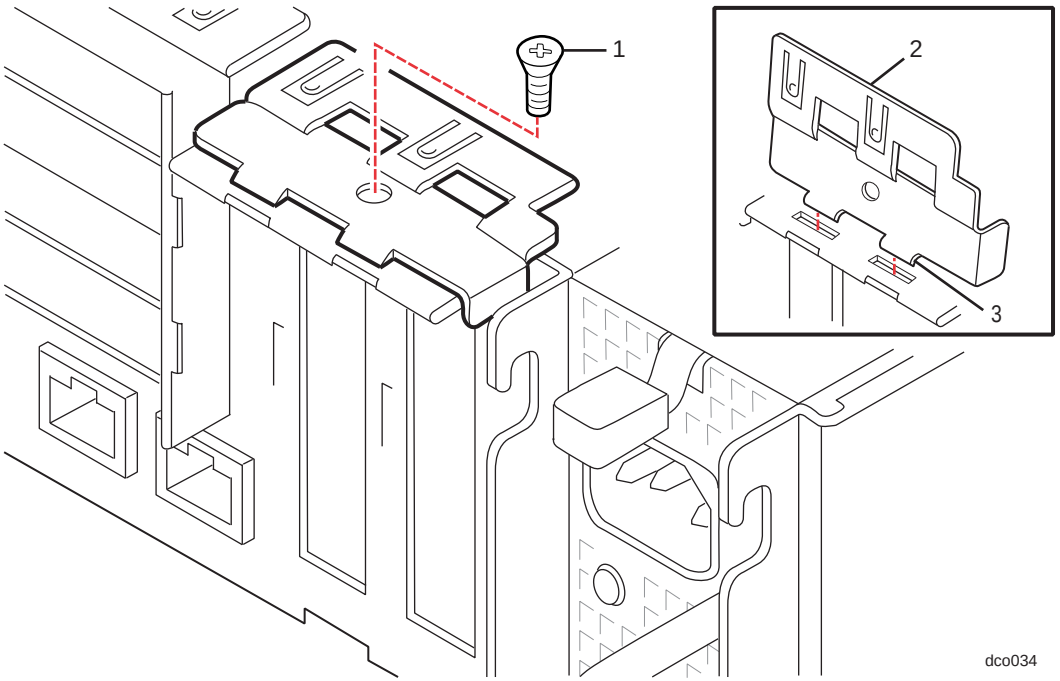
Removing a Low-Profile PCI Adapter

1. Remove the bezel.
2. Remove the CPU-I/O enclosure and remove the enclosure cover.
3. Remove the screw (number 1 in Figure 5-18) on the the top of the low-profile PCI adapter bracket (number 2).

NOTE

Be sure to keep track of the removed screws and brackets and keep them in a safe place while performing this procedure.

Figure 5-18. Removing the PCI Adapter Bracket



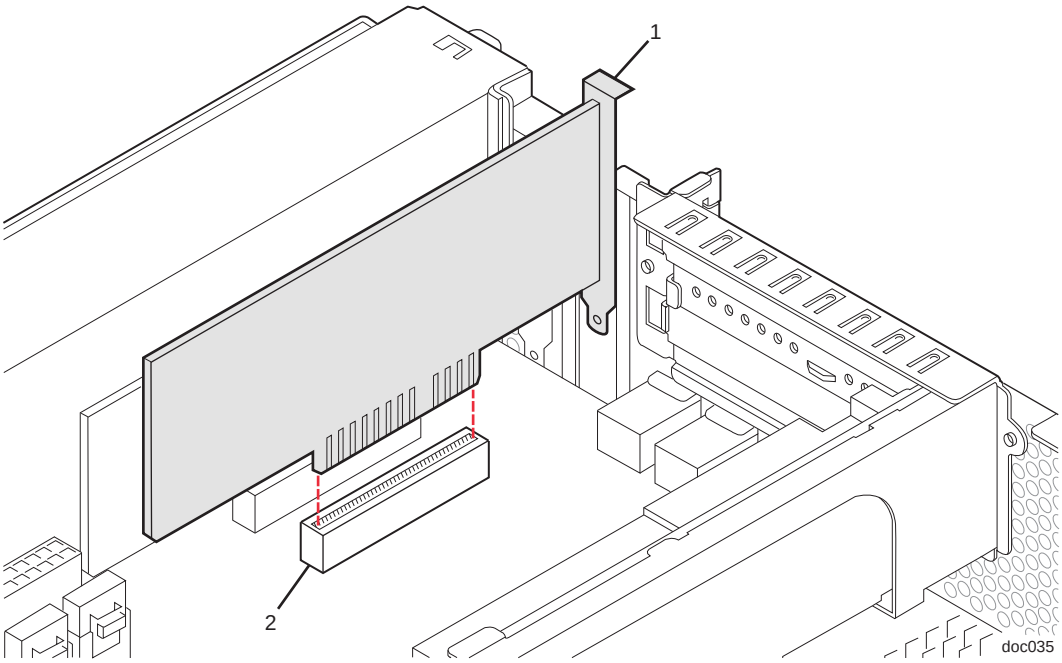
1 Screw

2 Low-profile PCI adapter bracket

3 Lower tabs

4. Remove the bracket by lifting it into a semi-upright position and removing its two lower tabs from the slots.
5. Pull the PCI adapter (number 1 in Figure 5-19) out of its connector (number 2). If the adapter does not disconnect easily, use a firm side-to-side tugging motion while maintaining steady pressure on the adapter.

Figure 5-19. Removing the PCI Adapter from the PCI Slot



1 PCI adapter

2 PCI adapter connector

If you are replacing a defective PCI adapter, set it aside for repacking. See “Repacking CRUs” on page 4-2.

Installing a Low-Profile PCI Adapter

CAUTION

When handling the PCI adapters, hold them securely by their edges. Do not touch their electronic elements.

1. Install the PCI adapter firmly into its connector.
2. Reattach the screw and bracket (numbers 1 and 2 in Figure 5-18) to the top of the low-profile PCI adapter cage.

   Place the bracket’s two lower tabs into the slots in the top of the low-profile adapter cage, as shown in Figure 5-18.

3. Replace the enclosure cover.
4. Replace the CPU-I/O enclosure.
5. Replace the bezel.

Replacing a PCI Riser Assembly and Its Adapters

You must remove the PCI riser assembly to install or remove full-height PCI adapters or to replace the PCI riser assembly itself.

NOTE

You can also install low-profile adapters in the PCI riser assembly.

When replacing a defective PCI riser assembly, remove the PCI adapters from the defective assembly and install them in the new assembly.

See the following topics:

- “Removing a PCI Riser Assembly” on page 5-39
- “Removing a Full-Height PCI Adapter” on page 5-41
- “Installing a Full-Height Adapter in the Riser Assembly” on page 5-43
- “Installing a PCI Riser Assembly” on page 5-44

Estimated time: Fifteen minutes.

Tools: Phillips head number 2 screwdriver.

CAUTION

It is especially important to use ESD precautions while performing this procedure because of the risk of touching electronically sensitive components on the riser assembly and PCI adapters.

Removing a PCI Riser Assembly

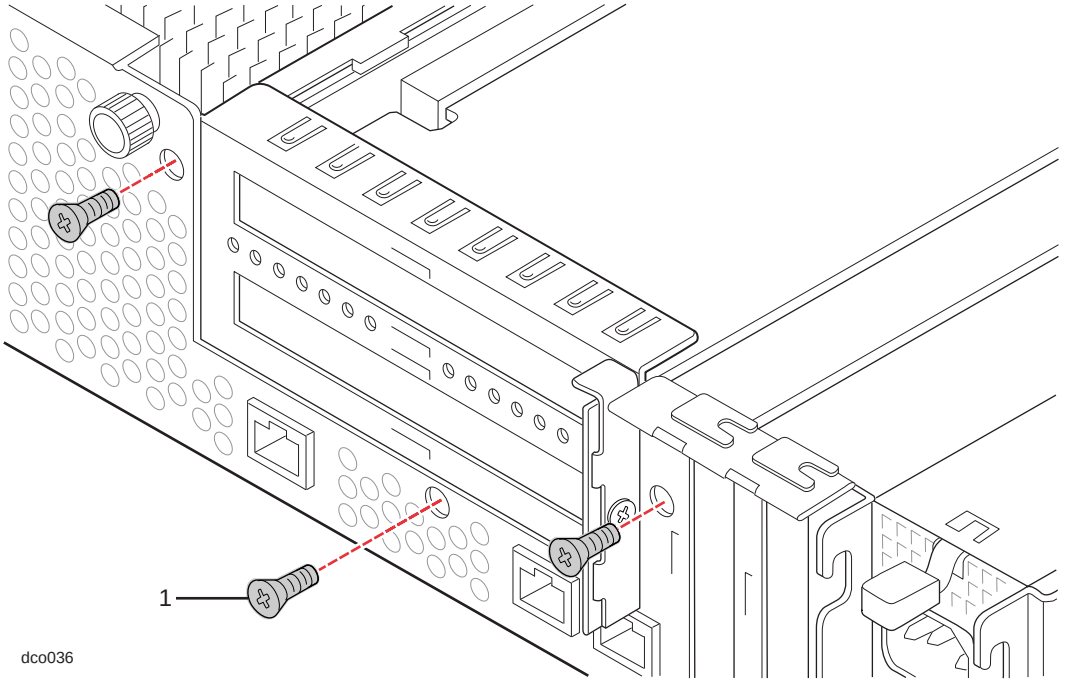
1. Remove the bezel.
2. Remove the CPU-I/O enclosure and remove the enclosure cover.
3. Remove the screw (number 1 in Figure 5-18) on the the top of the low-profile PCI adapter bracket.

NOTE

Keep track of the removed screws and brackets and keep them in a safe place while performing this procedure.

4. Remove the bracket (number 2 in Figure 5-18) by lifting it into a semi-upright position and removing its two lower tabs from the slots.
5. Remove the three PCI bulkhead bracket screws shown in Figure 5-20.

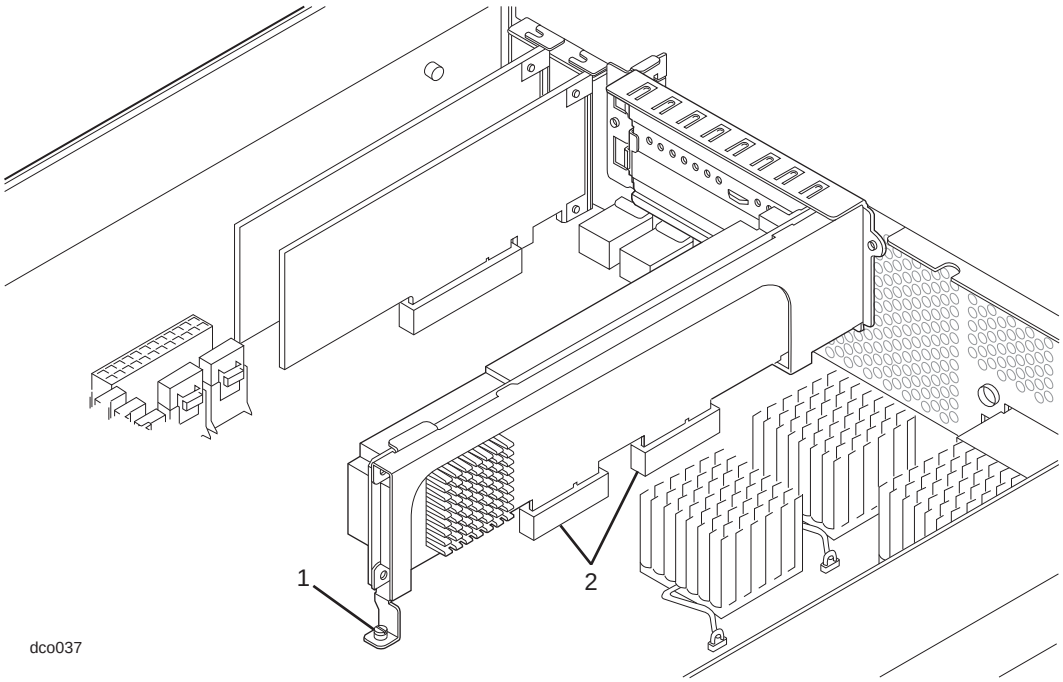
Figure 5-20. Removing the PCI Bulkhead Bracket Screws



1 Screws (3)

6. If you are removing an extra-long PCI riser assembly (PCI-X), loosen the captive screw (number 1 in Figure 5-21) that secures the inner end of the riser assembly to the motherboard.

Figure 5-21. Loosening the Captive Screw on the Motherboard



1 Captive screw on motherboard

2 PCI riser assembly connectors

CAUTION

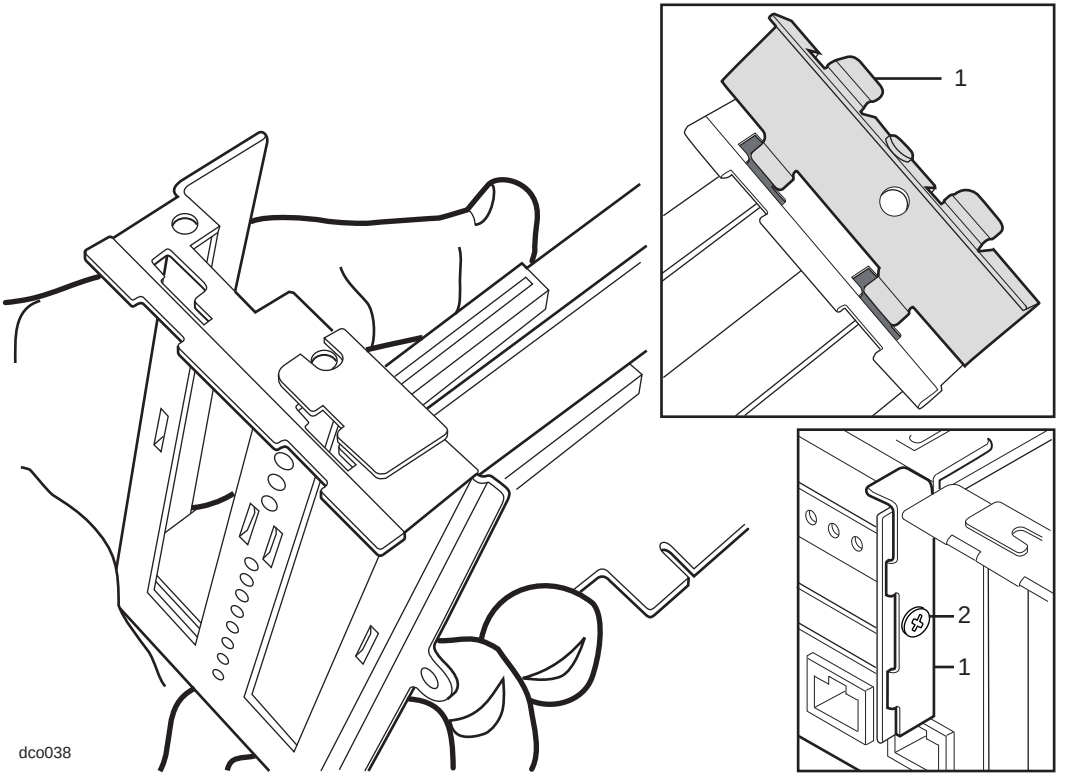
When handling the PCI riser assembly or PCI adapters, hold them securely by their edges. Do not touch their electronic elements.

7. Remove the PCI riser assembly from its connectors (number 2). Use a lifting and, if necessary, slightly rocking motion to free the assembly from its connectors.

Removing a Full-Height PCI Adapter

1. Hold the riser assembly as shown in Figure 5-22, and remove the screw (number 2) that secures the bracket (number 1) at the top of the PCI riser assembly.

Figure 5-22. Removing the Bracket from the PCI Riser Assembly



1 Bracket

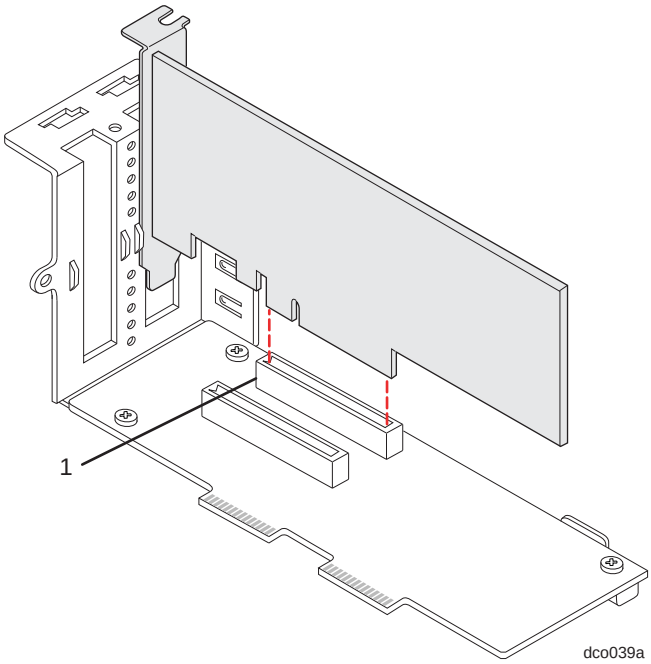
2 Screw

NOTE

Keep track of the removed screw and bracket and keep them in a safe place while performing this procedure.

2. Remove the bracket by lifting it into a semi-upright position and removing its two lower tabs from the slots.
3. Remove the adapter from its connector (number 1 in Figure 5-23). If the adapter does not disconnect easily, use a firm side-to-side tugging motion while maintaining steady pressure on the adapter.

Figure 5-23. Removing an Adapter from the Connector on the PCI Riser



1 Adapter connector

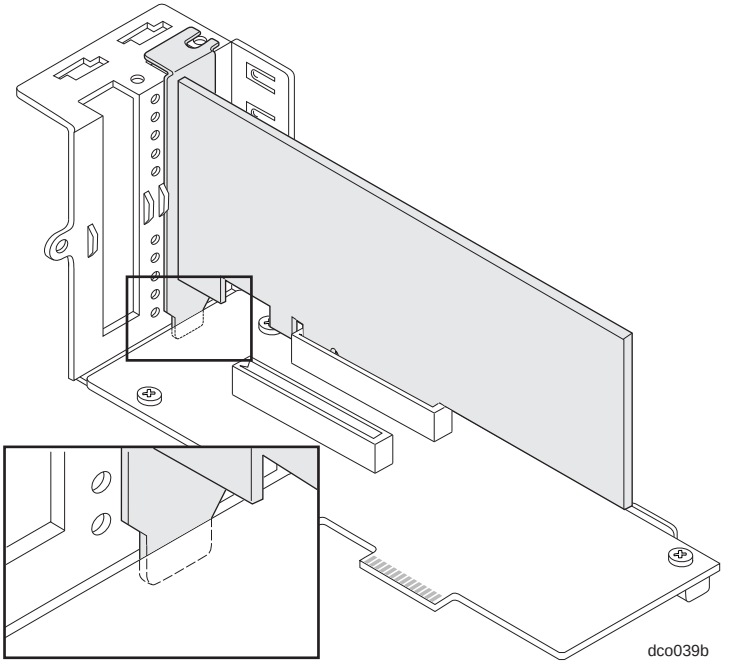
If you are replacing a defective PCI adapter, set it aside for repacking. See “Repacking CRUs” on page 4-2.

Installing a Full-Height Adapter in the Riser Assembly

1. After removing any full-height adapters, install the replacement full-height adapter by inserting it into its connector. (You can also install low-profile adapters in the PCI riser assembly.)

   When installing an adapter, be sure to slide its far end beneath the riser’s circuit board and above the metal edge at the end of the riser (see the highlighted area of Figure 5-24).

Figure 5-24. Inserting a Full-Height Adapter into the PCI Riser



If you are installing a 6.6 in. (167.75 mm) adapter, place it in the lower slot. If installing a 7.7 in. (195.94 mm) adapter, place it in the upper slot.

2. Proceed with "Installing a PCI Riser Assembly" on page 5-44.

Installing a PCI Riser Assembly

1. Holding the riser assembly as shown in Figure 5-22, attach the bracket (number 1) with the screw (number 2) to the top of the PCI riser assembly. Place the bracket's two lower tabs into the slots in the top of the full-height adapter cage, as shown in the figure.
2. Connect the PCI riser assembly to its connectors (number 2 in Figure 5-21) on the motherboard.

   If you are installing an extra-long PCI riser assembly, secure the captive screw (number 1 in Figure 5-21) at the end of the riser assembly to the motherboard.
3. Attach the three screws shown in Figure 5-20 (number 1).
4. On the low-profile PCI adapter cage, reattach the small bracket and screw that you removed in an earlier procedure (see Figure 5-18). Place the bracket's two lower tabs into the slots in the top of the low-profile adapter cage.

5. Replace the enclosure cover.
6. Replace the CPU-I/O enclosure.
7. Replace the bezel.

Removing and Inserting an Internal Hard Disk Drive

You can remove hard disk drives from a CPU-I/O enclosure to replace them or to perform other maintenance procedures. You do not need to power down the system or either CPU-I/O enclosure to perform this procedure. See the following topics:

- "Removing an Internal Hard Disk Drive" on page 5-45
- "Replacing an Internal Hard Disk Drive" on page 5-46

Estimated time: Less than a minute for each disk drive.

Tools: None.

Use ESD precautions when performing this procedure.

NOTE

Anytime you remove more than one disk drive at a time, label the drives on the bezel of each drive to ensure that you can replace them in the proper order. The numerical slot designation for each disk is noted on the front of the drive bay.

Removing an Internal Hard Disk Drive

1. Remove the bezel.
2. Press the green release button (number 1 in Figure 5-25) on the latch on the front of the disk drive, pull the latch (number 2), and remove the disk drive.

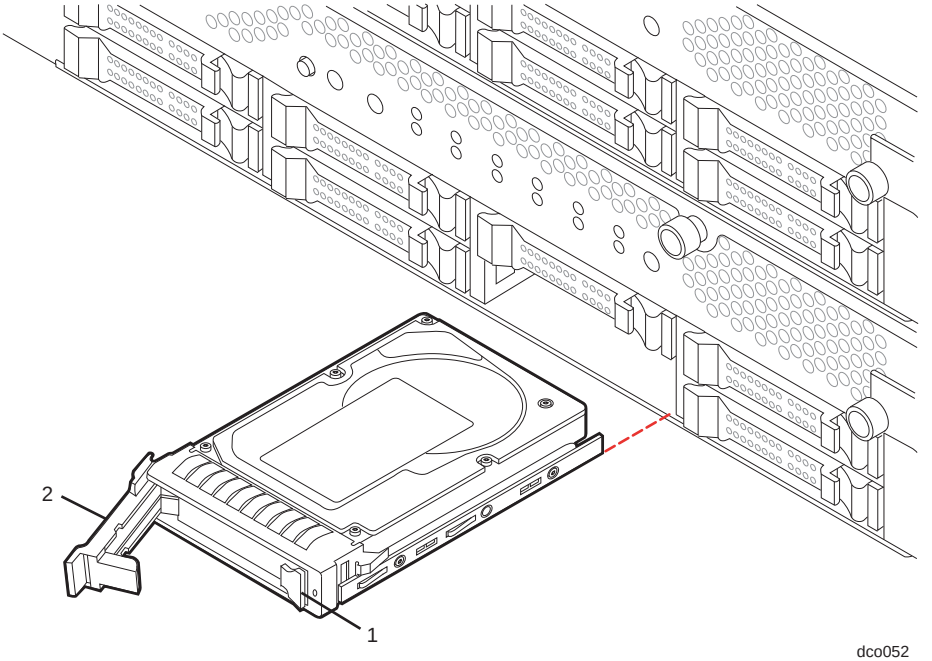
CAUTION

If the status LED for a disk drive is blinking yellow, do not remove the drive (see Table 3-4).

CAUTION

Do not pull the drive; use the latch.

Figure 5-25. Replacing a Disk Drive



1 Release button

2 Latch

If you are replacing a damaged disk drive, set it aside for repacking. See “Repacking CRUs” on page 4-2.

Replacing an Internal Hard Disk Drive

With the disk drive lever in the open position, slide the replacement disk drive into the system until it stops. Then, push on the latch until the drive locks into place. The latch should snap closed.

The new disk drive automatically resynchronizes with its partner if the companion disk drive is part of a mirrored disk pair. For more information about disk mirroring, see your system administration guide.

Removing and Replacing a DVD Drive

Each ftServer 2600, 4500, and 6300 system includes a single DVD drive that is installed in the front panel.

You perform this procedure when replacing a defective DVD drive and also when replacing the system front panel. (See "Removing and Replacing a Front Panel" on page 5-6.) You do not need to power down the system or either CPU-I/O enclosure to perform this procedure. See the following topics:

- "Removing a DVD Drive" on page 5-47
- "Replacing a DVD Drive" on page 5-48

Estimated time: Seven minutes.

Tools: Phillips head number 1 or 2 screwdriver.

Use ESD precautions when performing this procedure.

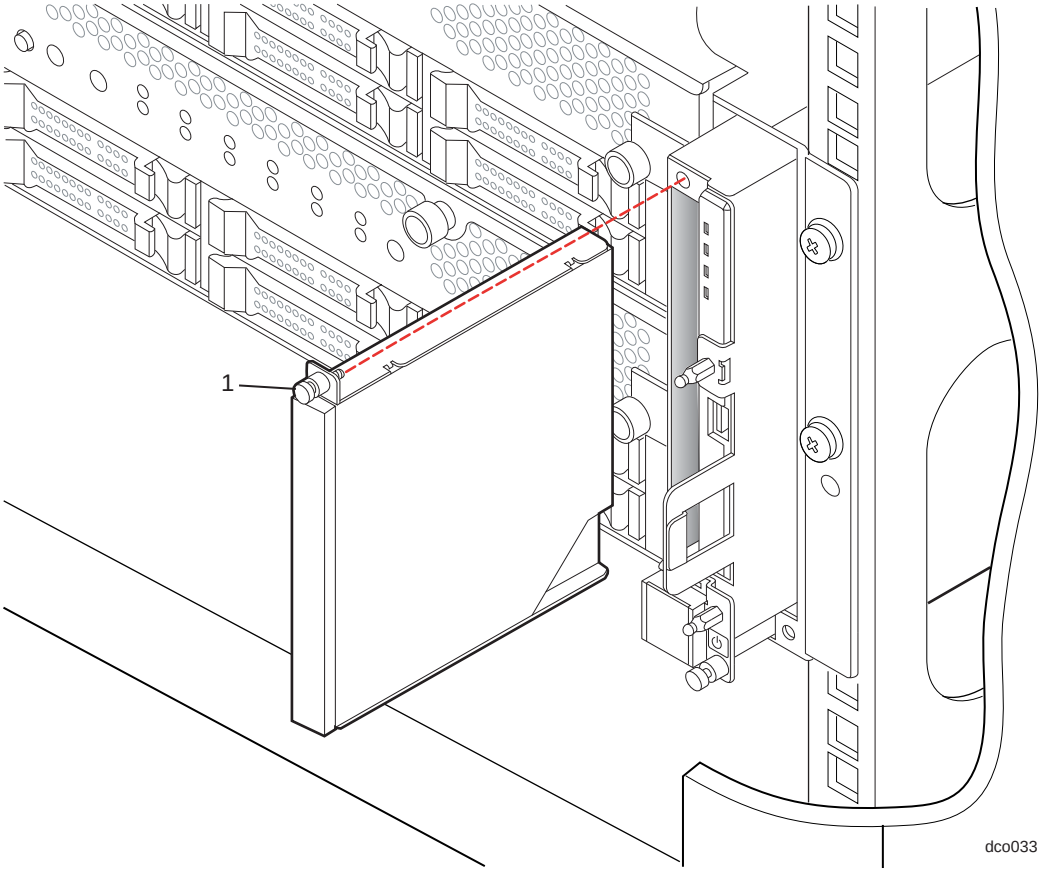
Removing a DVD Drive

CAUTION

The DVD drive is not hot-pluggable. Do not remove a DVD drive with the front panel plugged in.

1. Remove the bezel.
2. See the procedure "Removing the Front Panel" on page 5-6 to disconnect, but not remove, the front panel from the system backplane. Pull the front panel out a few inches to disengage it from the system backplane.
3. Loosen the thumbscrew (number 1 in Figure 5-26) at the top front of the DVD drive.

Figure 5-26. Replacing a DVD Drive



1 Thumbscrew

4. Pull the drive from the front panel assembly.

If you are replacing a defective drive, set it aside for repacking. See “Repacking CRUs” on page 4-2.

Replacing a DVD Drive

1. Insert the drive into the drive bay. Push firmly to engage the drive connector.
2. Tighten the captive screw (number 1 in Figure 5-26).
3. See “Replacing the Front Panel” on page 5-8 to reinstall the front panel.
4. Replace the bezel.

Replacing or Installing a Modem Assembly

The modem assembly is located on the system backplane assembly. You can install the modem for the first time or you can remove the modem to install a replacement.

CAUTION

You must turn off power to a powered-on modem before replacing it, but you do not need to shut down the system before performing this procedure.

This procedure assumes that the system is running. See the following topics:

- "Turning the Modem Off While the System Is Online (Windows Systems)" on page 5-49
- "Removing a Modem Assembly" on page 5-50
- "Replacing the Modem Assembly" on page 5-51
- "Turning the Modem On (Windows Systems) (Windows Systems)" on page 5-52

Estimated time: Twelve minutes

Tools: Number 2 Phillips head screwdriver.

Use ESD precautions when performing this procedure.

Turning the Modem Off While the System Is Online (Windows Systems)

To remove power from the modem while the system is still online, perform the following steps:

1. In ftSMC, expand **ftServer (Local)** and **ftServer Call Home Modem**.
2. Refer to the `PowerState` property in the details pane, or the state of the power (green) LED on the modem, to verify that the power is on.
3. If the modem power is on, select **Initiate BringDown** to turn it off.

Turning the Modem Off While the System Is Online (Linux and VMware ESX Systems)

To remove power from the modem while the system is still online, type the following command:

```
ftsmaint powerOff modem
```

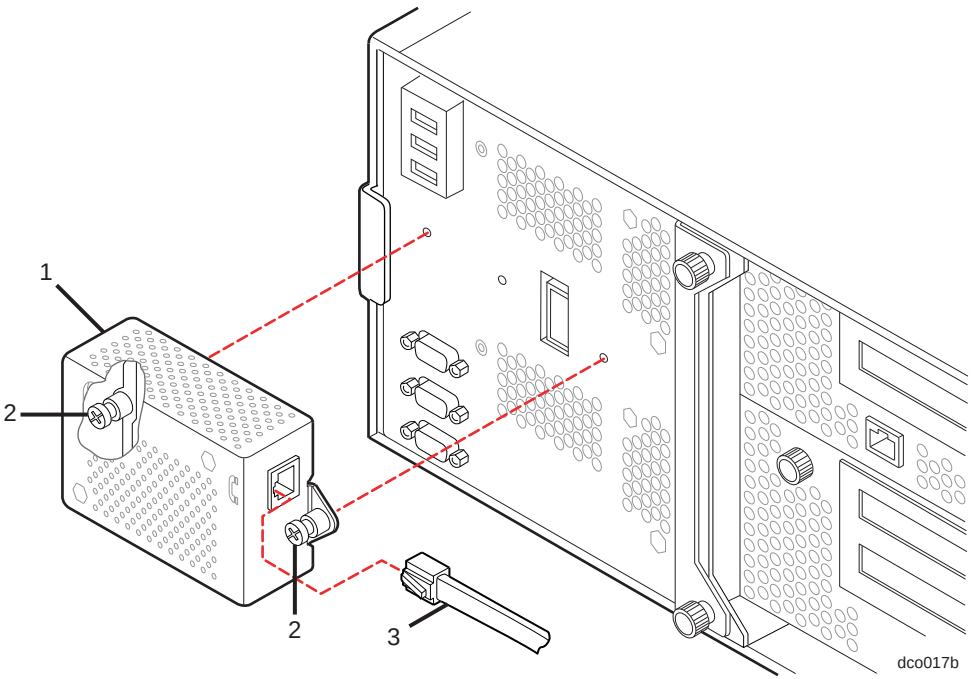
Removing a Modem Assembly

CAUTION

When removing or replacing a modem assembly, you must turn off power to the modem to prevent damage to the modem and the system. (When installing a modem for the first time, power to the modem connection is off by default.)

1. With the power removed from the modem (number 1 in Figure 5-27), disconnect the phone line from the connector (number 3) on the modem assembly.
2. Loosen the two captive screws (number 2) that fasten the modem assembly to the system backplane assembly at the rear of the enclosure.
3. Disconnect and remove the modem assembly by pulling it gently off of the system backplane assembly.
4. Set the defective modem assembly aside for repacking. See “Repacking CRUs” on page 4-2.

Figure 5-27. Replacing the Modem Assembly

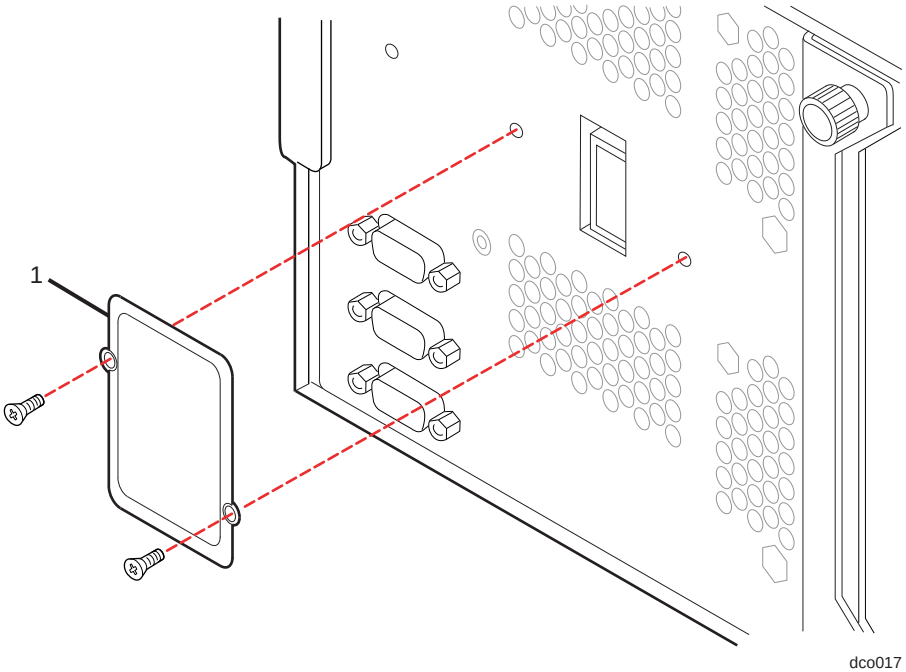


1 Modem assembly 2 Captive screws 3 Phone line connector

Replacing the Modem Assembly

1. If you are installing a modem for the first time, a metal plate (number 1 in Figure 5-28) covers the modem connector. Remove the plate by removing its two screws.
2. With the power removed from the modem, line up the modem assembly (number 1 in Figure 5-27) with the connector on the system backplane assembly.

Figure 5-28. Removing the Metal Plate Over the Modem Connector



1 Metal plate

3. Press the modem assembly firmly into the connector. The modem connector is keyed to fit only the correct way.
4. Tighten the two captive screws (number 2 in Figure 5-27) on the modem assembly to fasten it to the system backplane assembly.
5. Connect the phone line to the connector (number 3 in Figure 5-27) on the modem assembly.

NOTE

If your ftServer system was shut down prior to performing this procedure, return the system to operation.

Turning the Modem On (Windows Systems)

1. In ftSMC, expand **ftServer (Local)** and **ftServer Call Home Modem**.
2. Select **Initiate BringUp** to turn the modem on.

Turning the Modem On (Linux and VMware ESX Systems)

Type the following command:

```
ftsmaint powerOn modem
```

Removing and Replacing a PDU

A pair of PDUs provides power to the system and to other components in the main cabinet. PDUs are typically located in the bottom 2U of the cabinet. The pair of AAP87600F PDUs support ftServer 2600, 4500, and 6300 systems. See the following topics:

- "Removing a PDU" on page 5-52
- "Replacing a PDU" on page 5-54

Estimated time: Ten minutes.

Tools: Phillips head number 2 screwdriver.

Use ESD precautions when performing this procedure.

Removing a PDU

You do not need to shut down the system if you are replacing only one of the system's two PDUs. This procedure assumes that you are replacing only one PDU.

WARNING

Never work on a PDU that has power supplied to it. Doing so incurs the risk of electric shock that can cause death, severe personal injury, or substantial property damage.

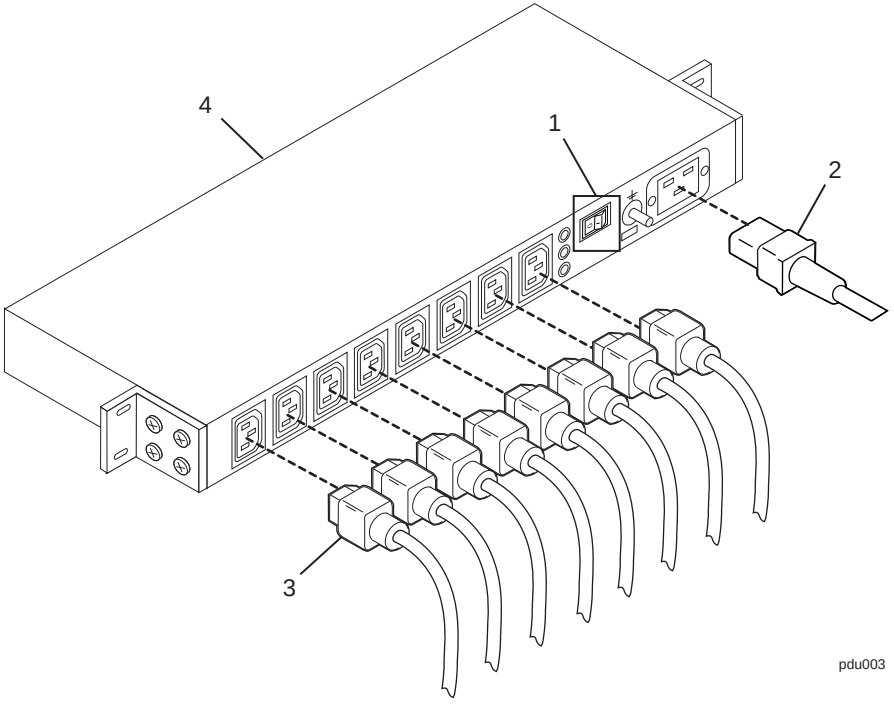
CAUTION

The following procedure assumes that you are replacing a single PDU. It is not necessary to remove the system from service if you are removing only one of a system's PDUs. If you are removing both of a system's PDUs, then you must shut down the entire system before performing the procedure.

1. Turn off the circuit breaker switch (number 1 in Figure 5-29).
2. Disconnect the PDU power-input cord (number 2) from the AC input connector socket and disconnect all power-jumper cords (number 3) from the PDU.
3. Support the PDU with one hand and remove the mounting-rail screws with the other.

If you are replacing a defective PDU, set it aside for repacking. See "Repacking CRUs" on page 4-2.

Figure 5-29. Replacing a PDU



1	Circuit breaker switch	3	Power-jumper cords
2	Power-input cord	4	Blank side of PDU

Replacing a PDU

1. At the back of the cabinet, hold the PDU so that the power outlets and controls face you, and the blank side of the PDU (number 4 in Figure 5-29) faces the front of the cabinet.
2. Supporting the PDU with one hand, use the other hand to insert the screws through the mounting bracket and through the rear rails.
3. Attach and tighten the screws into the cage nuts.
4. Connect the PDU power-input cord (number 2) to the AC input connector socket, and connect all power-jumper cords (number 3) from system components to the PDU.
5. Turn on the circuit breaker switch (number 1).

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